

CHALLENGING SCIENTIFIC HEGEMONY: THE COUNTER-HEGEMONY OF SASKATOON CREATIONISTS

A Thesis Submitted to the College of
Graduate and Postdoctoral Studies
In Partial Fulfillment of the Requirements
For the Degree of Doctor of Philosophy
In the College of Arts & Sciences, Department of Sociology
University of Saskatchewan
Saskatoon

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Abstract

The Evolution-Creation controversy has existed ever since Charles Darwin first published *On the Origin of Species* in 1859. Over a century and a half later this controversy is still far from being resolved, either in North America or the rest of the world. One of the reasons for the longevity of this battle between these religious devotees and the scientific community over the legitimacy of biological evolution is the prevalence of misinformation, misleading historical narratives, inaccurate labels, and outright myths concerning the motivations, beliefs, and spread of religious opposition to the teaching of biological evolution. This research first seeks to identify and interpret the problematic misinformation which permeates the available literature on this controversy. Next, fresh insights are gained from the study of the often ignored regional and local creationist organizations and groups. Data from qualitative semi-structured interviews are utilized to understand both how and why creationist organizations and groups form, what beliefs they hold to, and what their goals are. The Evolution-Creation Controversy is interpreted and analysed utilizing a wide-variety of different theoretical perspectives such as: Antonio Gramsci's hegemony, Stanley Cohn's folk devil and moral panic, Thomas Gieryn's public science and cultural cartography, as well as Pierre Bourdieu's field, capital, and habitus. One of the main findings of this study is that antievolutionist creationist groups and organizations are not homogeneous, but often engage in infighting, with many factors that prevent them from collaborating with one another. The study also reveals that, even with respect to highly contested issues like the evolution-creation controversy, there can be desires and possibilities to create social space for more fruitful debate and discussion.

Keywords: hegemony, folk devil, moral panic, cultural cartography, field, capital, habitus

Subject Terms: religion, science, evolution, creation

Acknowledgements

I would like to acknowledge the assistance and support of my committee members, especially my supervisor Terry Wotherspoon, as well as the many sociology professors at the University of Saskatchewan. They have all helped to shape and temper me as a sociologist.

Dedication

This thesis is dedicated to my wife. All of my work is but the interplay of our interactions and I no longer know which of my ideas are original and which the result of our discussions. She motivates me when I am exhausted, guides me when I am lost, and listens when I am frustrated. This research would not have been possible without her.

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Chapter 1: Introduction

The perceived interactions between scientific and religious knowledge and teachings throughout the 20th and 21st centuries, specifically those involving biological evolution, have led to the creation of a wide variety of social movements, as well as local, national, and even international social organizations which take sides on exactly how ‘science’ and ‘religion’ can and should interact (Forrest, 2008; Numbers, 2006). This ‘science’ and ‘religion’ debate centers around the implications of scientific theories and discoveries for religious worldviews (Dixon, 2008). Within this larger debate, certain religious individuals, groups, and organizations, collectively referred to as “creationists” (Numbers, 2011: 130), “fundamentalists” (Davis, 1995) and/or “antievolutionists” (Moran, 2003), have taken a myriad of different stances on how scientific and religious knowledge intersect, which has led many of them to reject, and to convince others to reject, the concepts and theories of biological evolution along with other scientific ideas as well (Scott, 2009). Antievolutionist creationists (AECs) have, since the 1920s (Shapiro, 2008; Zimmerman & Loye, 2011), helped to create a massive and worldwide antievolutionist movement (Numbers, 2006) which has forced scientists and scientific popularizers to respond by creating parallel social movements, groups, and organizations of their own to defend both the teaching and use of biological evolution (henceforth simply ‘evolution’) within the sciences (Forrest, 2008; Scott, 2009). Both sides, as will be shown, are fighting over the issues of origins, both scientifically and religiously, while disputing what science is and what implications scientific knowledge has for their own particular understandings of the origins of both ourselves and the universe.

There have been many different conflicts over past centuries between, what we would today refer to as ‘scientific discovery,’ and dogmatic interpretations of religious scripture (Brooks, 1991; Harrison, 2015). What this research engages with is the now worldwide conflict between AECs and the defenders of the use and teaching of biological evolution, or ‘evolutionists.’ The clash between AECs and evolutionists has come to be referred to as “the evolution-creation controversy” (Root-Bernstein &

McEachron, 1982: 413). The main purpose of this work is two-fold: first, it seeks to critique the now standard interpretation of the evolution-creation controversy as being one between a religiously neutral scientific community which often engages in science popularization activities on the one side; and scientifically ignorant and dogmatic religious fundamentalists on the other (Sager, 2008). As will be demonstrated, the present representations of this conflict of worldviews is often overly simplified and misrepresented within both the mainstream media and the academic literature (Numbers, 2006, 2011). Consequently, a comprehensive understanding of the issues involved requires a critical analysis of the history, circumstances, and presently available literature on this topic.

This critical analysis lays the groundwork for the second part of this work, a qualitative study which was conducted in order to gain a more holistic understanding of the little known, and not well understood, regional and local AEC organizations and groups. While the larger AEC organizations are studied in great detail in the available literature, these smaller organizations and groups are almost completely ignored (Numbers, 2006; Scott, 2009). Consequently, very little is known about the smaller-scale AEC organizational dynamics, the beliefs of their members, and their personal and organizational goals. By critiquing and clarifying the overarching narrative of this conflict while also studying the often ignored small-scale AEC organizations and groups, a much more nuanced and complex picture of the AEC and evolutionist conflict emerges, one in which the social arena where science is taught, explained, and occasionally debated publicly, a social arena known as “public science” (Gieryn, 1983: 782), becomes the battleground within which this conflict plays out.

Such an undertaking requires several theoretical perspectives in order to break down the available data and to interpret it. The presently available literature on the evolution-creation controversy is interpreted utilizing Antonio Gramsci’s concept of hegemony and Stanley Cohen’s concepts of folk devil and moral panic. Additionally, both the available literature and the qualitative data gathered is interpreted utilizing Thomas Gieryn’s concepts of public science and cultural cartography, as well as Pierre

Bourdieu's theoretical approach utilizing the interconnected concepts of fields, capitals, and habitus.

As many evolutionists are quick to state, biological evolution is not a controversial subject within the natural sciences (Miller, 2007; Scott, 2009). Instead the evolution-creation controversy takes place almost entirely outside of the institutions of science and science colleges. While occasionally occurring within universities, these debates, discussions, lectures, books, articles, campaigning, legal battles, lobbying, evangelism, and preaching tend to take place within public spaces, as well as private institutes and clubs (Numbers, 2006). The AECs and evolutionists operating within these spaces are also usually not trained or practicing research scientists and, as one might expect, very few possess a doctorate in the biological sciences (ibid.). As such this research draws attention to the nature of present-day public science as a somewhat unregulated space, defined especially through the position(s) of evolutionists who often claim to speak for all biologists or all scientists in general (Coyne, 2009). It also addresses the long-standing taboo within the scientific community regarding the practice of public science (Shermer, 2002).

Despite how 'creationist' and 'creationism' are the standard descriptors utilized for AECs within the available evolution-creation controversy literature (Numbers, 2006; Sager, 2008; Scott, 2009), this terminology is very problematic and misleading. It is important to differentiate between 'creationists' and AECs as the term creationist generally refers to anyone who believes that reality has been created, commonly by a divine being (Ruse, 2005). It is, consequently, problematic when all such belief systems, many of which are not in conflict with scientific understandings, are collectively labeled as being potentially problematic through inappropriate word usage. As will be discussed later, scientists are often perceived as having a bias against religious culture and belief (Miller, 2007) and utilizing the overgeneralized label of creationist or creationism serves to highlight and seemingly confirm this perception. So while many sources utilized here continue to refer to 'creationists,' the label AEC will be utilized to correct this frequently misused and commonly misunderstood term.

AECs interpret evolution, and sometimes other scientific theories and findings as well, as a threat to their beliefs and what they think science should be (National Academy of Sciences, 1984). They wish to see evolution altered, removed, critiqued, or balanced with alternative teachings which fit better with their worldviews (Numbers, 2006; Scott, 2009). As such, this research represents a microcosm of much more general social issues emerging as increasing globalization, especially through global migration and information technologies, are contributing to increasing diversity and interchange among religious groups. This research addresses questions about what can occur when certain groups, in this case defined through apparent oppositions between religion and public science, define certain types of knowledge as a threat and what tactics might be useful to lessen inter-group conflicts of this nature.

Challenges to evolution often take the form of attempts to alter how evolution is taught and presented, or to remove it from the school curriculum entirely through legal challenges or policy changes at the local, state, or national levels; often while introducing AEC worldviews into the science classroom as well (Forrest, 2008; Pruett, 1999). It is these incidents which have set the stage of the public debate, with AECs cast as those who simply oppose ideas, such as liberal theology, modernism, and Darwinism, based upon their religious beliefs. On the other side of the debate, evolutionists are presented as simply reacting to AEC campaigning and outreach while seeking to maintain the integrity of scientific education and research (Paterson & Rossow, 1999; Scott, 2009).

This topic has great sociological significance as it represents a long-standing and internationally growing societal tension which determines how scientific societies, scientists, and public scientists discuss and present information, and how a large proportion of the North American and global public reject scientific findings, data, and conclusions (Ehrlich and Holm, 1963; Jean & Lu, 2018; Numbers, 2006; Scott, 2009). It also highlights the potentially problematic nature of how alternative world views framed through public science and religion represent particular understandings about science and religion to both the public and legal experts. Questions concerning which knowledge should be taught in public schools, or which form of knowledge should

receive public funding, inevitably arise from such conflicts (Gieryn, 1999). Throughout much of the evolution-creation controversy sociologists have not contributed to the discussions or theoretically analyzed what is occurring. What research and analysis that has occurred has been infrequent and often focused on the periphery of the evolution-creation controversy (Scheitle & Ecklund, 2015). Occasionally the issues involved have been engaged with directly but only statistically with nationally representative polls (Hill, 2014). The exceptions to these trends occurred in the early 1980s when Thomas Gieryn (1983), Dorothy Nelkin (1977), and a few other researchers (Gieryn, et al., 1985), engaged in a theoretical analysis of the 'equal-time' court trials and textbook controversies, which are discussed in detail later.

This lack of involvement of sociologists has led to other disciplines 'taking up the slack' on this topic. Historians such as Ronald L. Numbers (2006) and Edward J. Larson (2006) have engaged in institutional analysis of the present-day evolution-creation controversy because no other academics from other disciplines are doing so. As such, there is not a significant body of sociological research and literature to draw upon to research topics such as this. Fortunately, there exists an extensive body of research and literature on this topic which is interdisciplinary in its scope and will henceforth be referenced as the evolution-creation controversy literature. It is to this body of literature which this research is necessarily situated and contributes to.

1.1 False Assumptions, Overgeneralizations and Strawmen

The evolution-creation controversy is typically discussed within a standardized framework involving a religiously neutral scientific community attempting to preserve both its own integrity, and the integrity of its teachings within high schools, in the face of relentless attacks by AECs on the validity of evolution and occasionally other scientific findings and ideas (Coyne, 2012; Scott, 2009; Zimmerman & Loye, 2011). Although AECs do not represent a single movement, have radically different worldviews, goals, and outreach activities (Hill, 2014; Scott, 2009), as well as very distinct teachings, arguments, and organizations (Numbers, 2006); they are often overgeneralized into a single social movement (Colburn & Henriques, 2006). Consequently, it is common for

evolutionists to discuss AECs as though they all act together and utilize similar tactics (Scott, 2009).

Interpreting all the AEC groups and organizations as a singular AEC social movement has led to the development and perpetuation of a completely inaccurate historical narrative where AECs are collectively depicted as acting and reacting to the continuous legal and social victories of evolutionists; the metaphors used to depict these historical events are *waves* (Zimmerman & Loye, 2011) or *periods* (Scott, 2009). A simple comparison of the dates when new AEC movements started and when waves or periods begin and end, demonstrates how given the wide variety of AEC writings, groups, and organizations, the history of the evolution-creation controversy cannot be neatly compartmentalized in this fashion (Numbers, 2006; Scott, 2009). This factually inaccurate historical narrative is utilized to present the public with two impressions. The first is that AECs act together to continuously adjust their tactics, as well as the worldviews they promote, in order to navigate the legal, political, and educational policy landscape in the U.S. (Scott, 2009). For example, while many evolutionists have claimed that Intelligent Design (ID) was created by AECs specifically to navigate the new legal environment created by a 1987 U.S. Supreme court decision (Scott, 2009; Zimmerman & Loye, 2011), in reality the majority of the large and influential AEC organizations “generally wanted as little to do with ID as ID theorists wanted to do with them” (Numbers, 2011: 134).

The second reason for this historical narrative is to present both scientists and the public with a victor’s narrative of history where the heroic evolutionists continuously defeat the ignorant and devious AECs who are collectively adjusting their tactics to alter educational laws and policies in order to either limit the teaching of evolution or to introduce AEC worldviews into high school science classrooms (Scott, 2009). Hence the history of the evolution-creation controversy is portrayed as a series of legal and educational policy victories for evolutionists over AECs throughout the 20th and 21st centuries (Scott, 2009). As this victor’s narrative of history requires a perceived victory over all AECs, rather than just a minority of them, as is actually the case (Numbers, 2006), there is an implicit tendency to continuously overgeneralize all AEC groups and organizations as a single movement or belief system (Root-Bernstein & McEachron,

1982). This has required the perpetuation of a series of widely-held myths regarding AEC worldviews, arguments, and the global spread of their ideas (Numbers, 2011). According to the historian and creationism expert, Ronald L. Numbers, “much misunderstanding abounds in the popular, and even in the pedagogic, literature on creationism” (2011:129).

It is common in the academic literature on the evolution-creation controversy to describe all AECs as having certain core characteristics (Root-Bernstein & McEachron, 1982). While this is usually the case in terms of believing that the Bible is the literal or inspired word of God, or that an AECs’ congregation has officially adopted an antievolutionist stance (Hill, 2014), often the stated core characteristics are a straw-man characteristic attributed to AECs. For example, the National Academy of Sciences (NAS) has stated that AEC claims “reverse the scientific process. The explanation is seen as unalterable, and evidence is sought only to support a particular conclusion by whatever means possible” (1999: 8). This was a clear misrepresentation as several years earlier, the National Academy of Sciences themselves had discussed an AEC publication where one group of AECs refuted another’s claims using scientific evidence (NAS, 1984). Numbers has explained that AEC explanations change so frequently that “creationist opinion probably changed more radically in the half-century from 1930 to 1980 than views of evolution” (Numbers, 2006: 275). In addition, Numbers provides numerous examples of misleading generalizations made by prominent evolutionary scientists about AECs which were factually erroneous when they made them (Numbers, 2011). It is ironic that when discussing the evolution-creation controversy, it is frequently the defenders of science who abandon evidence and data in favor of straw-man arguments, misleading rhetorical strategies, and widely-held myths when seeking to defend the integrity of science against AEC worldviews (Jean & Lu, 2018; Numbers, 2011).

While it is true that evolutionists have had many legal and policy victories over AEC lobbyists and organizations, AECs have never been more numerous. At present, 66% of Americans (Gallup, 2014) and nearly a quarter of all Canadians (Angus-Reid, 2012) have adopted AEC worldviews. AECs in Canada, unlike their American counterparts, have had a lot of success instituting formal educational policies to limit the

teaching of evolution and allow the teaching of AEC worldviews in high school science classrooms (Barker, 2004). In the U.S. AECs have had even more success than Canadian AECs teaching their worldviews to high school students, despite losing all major court cases which challenged their right to do so (Scott, 2009). Even with these legal setbacks, there are entire school districts in the U.S. which teach AEC illegally (Traxler, 1993). Also, in the U.S. evolution is only taught correctly by 28% of high school biology teachers (Berkman & Plutzer, 2011), and “almost one-fourth of biology teachers believe that creationism has a valid scientific foundation...one-sixth of biology teachers are young-Earth creationists...and 15 percent of biology teachers believe that evolution is not a scientifically valid idea” (Moore & Cotner, 2009: 433). These and other research findings have led researchers to conclude “that creationism continues to be part of approximately one-fourth of high-school biology classes” and that “only 67 to 77 percent of the teachers who teach evolution are teaching that evolution is a credible scientific theory” (Moore & Cotner, 2009: 432).

The evolution-creation controversy at present resembles a World War I battlefield rather than a public town hall debate. The two sides, evolutionists and AECs, usually do not directly engage with one another. Their worldviews and understandings of their opponents have become institutionally entrenched to such an extent that they are difficult to change and simply do not demonstrate an accurate understanding of their opponents’ worldviews (Numbers, 2011; Scott, 2009). The positions of evolutionists and AECs have been institutionalized for some time, with AECs forming the first antievolutionist organization in 1935 (Numbers, 2006), and evolutionists forming the first anti-AEC organization in 1983 (Scott, 1997). Since this time AECs have created hundreds of local, regional, national, and international AEC organizations to prevent the public’s belief in, as well as the teaching of, evolution, along with promoting particular AEC worldviews (Abramson, 2017; Northwest Creation Network, 2016; Numbers, 2006).

On the evolutionist side, as one might expect, a large number of scientific societies explicitly reject the arguments and worldviews of AECs (American Civil Liberties Union, 2017). “By a recent count, over seventy-five professional scientific organizations have issued public statements opposing ID and other forms of

creationism and nearly all say explicitly that these are not science” (Pennock, 2011: 197). Many have become engaged by seeking to study the public’s attitudes about evolution as well as to educate the public about evolution in a more comprehensive manner (Coalition of Scientific Societies, 2007). In addition, a myriad of strictly anti-AEC societies has developed both in Canada and throughout the United States, which engage the public in multiple forms of outreach. These explicitly anti-AEC organizations and groups have been shown to be very short-lived historically, only appearing for brief periods during public tension and awareness over AEC outreach activities (Barker, 2004; Forrest, 2008; Park, 1997). The largest of these, the National Center for Science Education, is thus far the single exception to this historical trend. It has expanded to become the largest anti-AEC organization by far with chapter organizations in several countries (Barker, 2004; Forrest, 2008).

1.2 Rationale and Research Questions

In her 2009 book on the evolution-creation controversy, the former director of the National Center for Science Education and renowned evolutionist, Eugenie C. Scott, wrote “the creationism/evolution controversy has been of long duration in American society and shows no sign of disappearing” (Scott, 2009: 1). Polling data certainly seems to support her observations as Gallup polls since 1982 have shown AEC beliefs to be consistently held by 40-47% of the American population as of 2014 (Gallup, 2014). However, a 2007 Gallup study found that 66% of Americans believe that AEC beliefs are definitely or probably true (ibid.). This discrepancy clearly demonstrates how different public surveys, which provide different options to select from in their polls, elicit widely divergent findings; this has been noted in several such studies (Hill, 2014). Consequently, all the polling data can only resemble a rough estimate of how the public views evolution and AEC worldviews.

Continuous large polling numbers, combined with an increasingly large adoption of AEC worldviews by other regions and religions across the globe clearly demonstrate that AEC is now a global social movement (Numbers, 2006, 2011). The proportion of AECs in other countries, especially countries with Muslim majorities, are occasionally much larger than the proportion in the U.S. (Hameed, 2008). A 2012 Angus Reid poll

found 51% of Americans, 22% of Canadians, and 17% of Britons hold AEC beliefs. A newspaper poll published in 2000 found a much higher percentage (38%) of Canadians were AECs (Barker, 2004). In the last few decades AEC has spread beyond Christianity to become incorporated into several other religious belief systems such as Islam, Judaism, and Hinduism (Numbers, 2006). In addition, AEC organizations have expanded their activities and opened chapters within many countries around the globe (Curry, 2009; Numbers, 2006).

While many polling companies and academics are studying AEC in increasing detail in the U.S., the phenomenon is largely ignored in Canada (Barker, 2004). The only reliable polling data available for AECs in Canada comes from the Angus Reid poll mentioned above. But as one researcher pointed out “Christian creationism does not recognize the political border between Canada and the United States” (Barker, 2004: 85). At least one international AEC organization, Creation Ministries International, has established itself in Canada, while other organizations based in the U.S. have provided materials, funds, and speakers, as well as assisting with events in Canada (Barker, 2004; Numbers, 2006). There are even examples of American AECs contributing to the breakdown of more liberal AEC organizations (those which tend to be more accepting of scientific data and theories), while assisting the more conservative and biblically literalist AEC organizations to thrive (Barker, 2004). These factors have assisted with the creation of a myriad of both regional and local AEC organizations in Canada since the late 1960s (Abramson, 2017; Barker, 2004). Barker (2004: 87) observes that, “At present, there are loosely allied creation science associations in every province (with the Atlantic provinces represented collectively by the Creation Science Association of Atlantic Canada).” Their effect upon Canadian beliefs appears significant as “a poll on religious attitudes in Canada published by Maclean’s magazine in April 1993 suggested that upwards of 53 per cent of adult Canadians reject evolution” (Barker, 2004: 89). However, a more recent poll found that 61% of Canadians believe human beings evolved from less advanced forms of life over millions of years (Angus Reid, 2012); while a significant improvement, it still demonstrates that 39% of Canadians either reject or are not certain of evolution.

It is also important to note that, while rejection of evolution by the public is considered very problematic by the scientific community and is a central feature in the evolution-creation controversy (Coyne, 2012), it is not the same as advocating for an AEC worldview. Polling numbers are frequently made available in many countries for belief in, and rejection of, evolution. However, those who reject evolution do not necessarily do so in favor of an AEC worldview, as several studies have shown (Gallup, 2014; Hill, 2014). For example, according to a meta-analysis done by the National Science Foundation (NSF), 31% of the population of China disagrees with the statement “human beings, as we know them today, developed from earlier species of animals” (2012). However, Numbers has explained that mainland China is, thus far, the only country in the world which has not allowed AEC organizations to engage in outreach within its mainland borders; they have, however, spread to Taiwan and Hong Kong (2006). When combined with how the Christian population of China, the bedrock of the global AEC movement, only represents 5% of the total population (Pew, 2011), this shows that the large proportion of antievolutionists in China likely has little to do with the global spread of AEC organizations, or AEC worldviews in general.

Despite having similar teachings, materials, and engaging in similar outreach activities, AECs in Canada are much less visible to the Canadian public when compared with AECs in the US (Barker, 2004; Numbers, 2006). There are several reasons for these differences. Canadian AECs lack access to massive networks of Christian radio and television stations, which are regularly utilized by AECs in the U.S. (Barker, 2004). AECs also largely avoid politics in Canada. This is due to how, while it is acceptable to hold an AEC worldview in American politics (Dawkins, 2015), this is not the case in Canadian politics. A recent news article in a Canadian national newspaper summarized the unacceptability of AEC beliefs with its title, “Being a creationist conservative in Canada ‘gives your opponents a tremendous amount of ammunition’” (Gerson, 2015). Others have mentioned “the Stockwell Day episode” - during the November 2000 federal election when he was “thoroughly savaged” by the popular media for his Young-Earth Creationist beliefs, and the general “media hostility” in Canada towards those holding AEC worldviews (Barker, 2004: 96). While not fashionable politically, AEC outreach, private schools, and equal-time policies (where AEC worldviews are taught

alongside evolution in high school science classrooms) have not faced sustained challenges by academics, the media, or the courts to the same extent as in the U.S. (Barker, 2004; Scott, 2009). By 2004 the anthropologist John Baker (2004: 95) explained,

Few articles on creationism show up in Canadian periodical indexes...and many of these focus upon conflicts in the United States. Neither of the two major scholarly journals on Canadian religion has published an article on creationism...Recent histories and surveys of religion in Canada provide information on evangelicals but say nothing about creationist ideas or activities.

In terms of both legal and formal educational policies, the Canadian AECs have become much more successful than their American counterparts. While it became illegal in 1968 to prevent the teaching of evolution in the U.S. (Scott, 2009), there are official educational policies within areas of Canada which limit the teaching of evolution (Barker, 2004). Also, while equal-time legislation became illegal in 1987 in the U.S. (Scott, 2009), in Canada there are formal educational policies which allow for the teaching of AEC worldviews in high school science classes in several provinces, as well as the likely possibility of formal equal-time policies still existing in certain school districts (Barker, 2004). Additionally, private fundamentalist Christian schools, such as the Covenant Community Training School in Alberta, have been teaching that evolution is incorrect and that AEC worldviews are better science since the mid-1970s (Alexander, 1980). Regarding public schools, there have been several equal-time school district policies implemented in Canada; one in Abbotsford, B.C. from 1983-1995 (Barker, 2004), and one in the East Smoky County School District in Alberta starting in 1971, and which seems to still exist as policy today (Alexander, 1980; Interviewee D). Similar legislation in the U.S. lasted less than a year before it was challenged and defeated in court (Scott, 2009), however there have been no AEC policy court cases in Canada (Barker, 2004). It is also the case in many provinces in Canada that human origins cannot be discussed as a matter of policy in high school science classes. Baker (2004: 92-93) explains how,

it is entirely possible that some biology teachers avoid the specific subject of human origins when teaching about evolution, either from personal conviction or to avoid controversy. In fact, this is the official stance of the Atlantic provinces. Students may infer the implications of natural selection and other evolutionary

processes upon humans, but a discussion of human origins is not included in the senior high school science curriculum.

Another factor contributing to the invisibility of AEC in Canada is how AEC outreach and educational policies have been largely unchallenged in Canada. By the late 1980s there were at least five Canadian anti-creationist organizations, however, by the turn of the 21st century, all of these organizations appear to be inactive (Park, 1997). The last remaining such organization, the Organization of Advocates for Support of Integrity in Science Education based in Ontario, ceased activities around the year 2000 (Barker, 2004). Despite all the successes AECs have had in terms of outreach and formal educational policies across Canada, the lack of challenges in terms of court cases and media coverage, of which the vast majority would likely be negative (Barker, 2004; Scott, 2009), coupled with the unacceptability of AEC worldviews in Canadian politics, has been taken as evidence that AEC organizations are nowhere near as successful as their counterparts in the U.S. (Barker, 2004). If academics are concluding that AECs are failing to have a significant impact within Canadian society, there appears to be little reason to study them in greater detail.

It is precisely this invisibility, however, which has allowed the successes of Canadian AECs in implementing educational policies which allow them to formally teach AEC worldviews and eliminate objectionable aspects of evolution in high school science classes; clearly demonstrating their ability to have a significant impact upon how science is both understood and accepted within a Canadian context. As Barker pointed out, AEC activity in Canada is largely invisible in part because academics and the media largely ignore it (2004). In other words, their invisibility prevents challenges to their agendas by convincing the media and academics that they must not be very active. This invisibility, coupled with how regional and local AEC organizations and groups are hardly mentioned in evolution-creation controversy literature, provides the main rationale for this study (Numbers, 2006; Scott, 2009).

There is a problematic lack of academic studies and analysis on regional and local AEC groups and organizations. The vast majority of media coverage and academic literature on the evolution-creation controversy ignores these smaller collections of AECs in favor of carefully cataloguing the history and activities of the

national and international AEC organizations (Numbers, 2006; Scott, 2009). To the extent they are mentioned at all, it is often simply to point out that they financially support, advertise for, and utilize materials of the larger AEC organizations (Scott, 2009). While Scott makes no assumptions as to the views of the members of regional and local AEC groups, her summarization of their views was simply that they were “organizations that promote the [AEC] views of Henry Morris” (Scott, 2009: 110); Morris being one of the most influential AEC leaders who was partly responsible for the 1960s creationist revival (Numbers, 2006). While this may be the case, it is a poor assumption that these smaller groups are simply tiny versions of the larger organizations. In 1999 one of the largest international AEC organizations, Answers in Genesis (AiG), “absorbed the old Creation Science Association of Ontario” (Numbers, 2006: 405) to create the largest AEC organization within Canada. However, the other provincial organizations still exist as separate entities likely because they did not want to merge with this larger organization. Had these smaller organizations shared common beliefs and agendas with AiG then it would have made sense for their organizations to become chapter organizations of the AiG as well.

As for myself, attending several AEC lectures in Saskatoon has demonstrated that many local, regional, national, and international organizations, along with their educational and informational materials, are all utilized and made available at such events. Local and regional partnerships appear to be at play at such events. In fact, the most noticeable aspect of the display tables at these events is the presence of materials that often contain AEC worldviews which contradict those of the speaker. At one event a Young-Earth Creationist was the lecturer, while many Intelligent Design and Old-Earth Creationism materials were available for free or to purchase. While it has been shown that the vast majority of national and international AEC organizations have strict statements of faith which serve to dogmatically ‘lock-in’ its members (Numbers, 2006), these smaller AEC groups do not appear to restrict themselves dogmatically in a similar manner. Consequently, interpreting the regional and local AEC groups and organizations as simply a collection of smaller scale versions of the larger organizations is potentially very misleading.

Due both to the success of AECs within Canada at altering the school curriculums within Canadian schools, and to Canadian academics largely ignoring them (Barker, 2004), this research attempts to explore how these regional and local AEC organizations and groups form, develop, and interact with one another. Such research is warranted due to how most AECs within Canada, to the extent that they belong to AEC organizations or groups, belong to the regional and local ones (Barker, 2004). As almost a quarter of the Canadian population hold AEC worldviews, a more holistic and comprehensive understanding of why they develop, how they develop, what worldview(s) they promote, their goals, and their personal beliefs are fundamentally important for resolving the evolution-creation controversy within Canada.

These general rationales lead to these specific research questions.

- 1) Under what circumstances did these regional and local organizations and groups form? Specifically, what social fields, social structuring, and concerns led to their development?

This is a question which is regularly addressed regarding the large national and international AEC organizations, but is regularly ignored, along with almost all information regarding regional and local AEC groups and organizations (Numbers, 2006; Scott, 2009). This question will determine if there are trends regarding the formation of these regional and local organizations and groups. Do these fields form due to grass-root critiques about evolution or are they usually connected somehow with the larger AEC organizations, which is suggested by the available evolution-creation controversy literature? Do they consistently form out of fundamentalist churches or more liberal (accepting of scientific data and theories) ones? Are the AEC organizations and groups structured in a hierarchical manner, similar to the larger AEC organizations, or are they more democratic?

- 2) What factors influence AEC organization and group collaboration? Do the capitals present within one field transfer to another field easily?

This question attempts to determine how and to what extent regional and local AEC organizations and groups can and do work together. The folk devil of AEC presents all AECs, their groups and organizations, as existing within a single specific

field. Consequently, collaboration would be easily accomplished if such a situation actually exists. But are there factors which serve to prevent their collaboration? As will be shown in chapter 4, the folk devil of AEC is highly erroneous regarding larger AEC organizations, but there is presently little to no research to identify the factors which assist or hinder effective collaboration from occurring among regional and local AEC groups and organizations.

- 3) Do these AECs around Saskatoon base their objections to evolution on purely literalist interpretations of scripture or are these people actively attempting to understand science and evolution?

Saskatoon has many different church organizations, as well as several different para-church organizations which advocate for AEC worldviews. Given this situation, as well as the time and monetary constraints upon this research, Saskatoon provided an excellent opportunity to explore both regional and local AEC organizations within a particular community context. This question engages directly with many of the myths present within the evolution-creation controversy literature. Some of the most prevalent myths concern why AECs object to the teaching of evolution or other areas of science more generally. All evolutionists within the available literature necessarily make the conclusion that AECs do not understand evolution, or science more generally, in a correct manner (Miller, 2007). Additionally, AECs generally have their positions judged based upon how literally they interpret their scriptures (Scott, 2009). Hence, the two criteria for why AECs argue against the teaching of evolution is due to scriptural literalism and scientific misunderstandings (Dixon, 2008). Consequently, this question incorporates questions such as: to what extent have these AECs taken the time to accumulate cultural and symbolic capitals in order to understand science and evolution? Would they be willing to change their minds based upon scientific evidence? Additionally, this question will help to understand whether these AECs interpret any distinction between 'evolution,' 'evolutionism,' and 'the philosophical materialist interpretation of science.' This can serve as an indicator of just how successful evolutionists have been at blending these ideas together and thereby confusing the public, other scientists, as well as AECs into believing that they are the same thing.

4) Does the individual habitus of AECs match the AEC field which they belong to?

There exists an overarching assumption throughout the evolution-creation controversy literature that AECs accept holistically the cartography promoted by the AEC group or organization they belong to. This question seeks to determine whether or not this is the case, because if it is not the case, there is a very large and unstudied area of the evolution-creation controversy which needs to be addressed. Specifically this question addresses two things: first, are all those who teach or promote AEC worldviews and arguments actually antievolutionists themselves? Second, do these AEC's beliefs match the statement of faith promoted by their organization or group? Or does their organization or group even have a statement of faith which must be adhered to? These questions determine whether the frequent critique of AECs, that they are overly dogmatic, is valid or simply another straw-man argument.

5) What are the perceived goals or endgames which these AECs wish to accomplish through their outreach and activities? How do these relate to a possible means of resolving the evolution-creation controversy?

The issues of perceived goals and endgames is hardly ever discussed within the evolution-creation controversy literature. This is due to the standard focus on only the national and international AEC organizations which want to minimize or completely eliminate the teaching of evolution (Scott, 2009). Additionally, this question has relevance for proposing strategies by which the evolution-creation controversy might be directly addressed or potentially minimized in its effects. As such this question seeks to understand why these AECs are involved with these organizations and groups. What is it that they hope to accomplish? And how do these goals and endgame scenarios relate to any possible means of lessening or resolving the evolution-creation controversy?

These questions will be answered through a combination of critical historical analysis of the available evolution-creation controversy literature, an analysis of already existing large-scale studies which have been conducted to determine the extent and influence of AEC beliefs within religious denominations and within the populations of

several countries more generally, as well as by utilizing the qualitative interview data gained from the nine interviews conducted for this research.

This research is important because it offers findings that make it possible to understand, in ways that avoid dominant polarizing frameworks, the actual dynamics of AEC outreach and the consequences of evolutionist public science outreach over the past decades in ‘countering’ the perceived AEC threat. The findings reveal that, in order to gain a coherent understanding of the evolution-creation controversy, it is essential to uncover the extensive misinformation present within the presently available literature, and to address informational gaps to develop a better understanding of the founding, development, and outreach of regional and local AEC organizations and groups, as well as the actual beliefs and goals of its members. I argue that, in the absence of this knowledge, the scientific community is likely to continue to be limited in the extent to which it will be able to engage successfully and in meaningful ways with AECs (Berkman & Plutzer, 2011; Moore & Cotner, 2009: 433).

1.3 Outline

This chapter has provided a brief overview of the main problematic areas of AEC historical analysis to date. It has also discussed the rationales for conducting this research, the specific reasons as to why it is important, providing and discussing the five specific research questions which will be addressed by the qualitative interviews conducted for this research. The academic and media representations of AECs constitute one of the main reasons why a resolution to the evolution-creation controversy has not been viable in the past and appears to be increasingly difficult to attain at present. In fact, the perpetuation of false assumptions, overgeneralizations, and a straw-man arguments within literature on the evolution-creation controversy only serves to misrepresent and confuse those who seek to understand the issues involved (Barker, 2004; Numbers, 2011). Specifically, this thesis seeks to explore Canadian AEC groups and organizations, focusing on the regional and local ones, which have been largely ignored throughout the literature on the evolution-creation controversy. Under what circumstances they are created, how they are structured, how they interact

with one another, how they relate with much larger AEC organizations, and what effect the AEC worldviews have upon their personal beliefs, goals, and practices.

Chapter two provides an overview of the standard history as portrayed within the academic literature on the evolution-creation controversy. It addresses critically the standard history of the evolution-creation controversy in the U.S., along with a breakdown of the terms *creationism* and *creationist*. As it presently exists as a morass of confusing, highly biased, and often inaccurate information (Numbers, 2011), this history is broken down utilizing the concept *hegemony*, which is shown to be essential to understanding how AECs, their organizations, and their outreach are problematized. This largely historical analysis is necessary in order to properly situate AECs within the presently available literature on the evolution-creation controversy, as well as to understand the scientific responses to their organizations and outreach.

Chapter three provides a critical analysis of the available literature on the evolution-creation controversy to highlight the common misconceptions regarding why evolution is so frequently perceived as threatening by AECs, and how evolutionists commonly misrepresent AECs as a *folk devil*, as well as how the history of the evolution-creation controversy is commonly presented as a *victor's historical narrative*. This folk devil and victor's historical narrative are interpreted through the lens of Steven Shapin's conception of trust in scientific knowledge-making enterprises and how these labels and historical narratives seek to undermine the scientific and public trust in AEC worldviews and arguments. This creates a situation wherein scientists are justified in simply dismissing AECs as untrustworthy rather than actually engaging with their critiques, arguments, and worldviews. Additionally, recent historical analysis of the evolution-creation controversy is combined with the latest statistical research to demonstrate that it is not AEC worldviews per se which have led to the development, spread, and influence of AEC organizations. Instead, it is the organizations themselves which serve to mobilize a population of AECs which often do not believe in the worldviews which the organizations themselves are promoting. This chapter focuses on how the antievolutionist movement began in the U.S., who the key players were, and the trends regarding advocacy of particular AEC worldviews. Also, the

institutionalization of AEC worldviews will be addressed to understand how dogmatic statements of faith have influenced the development of AEC organizations.

Chapter four provides the theoretical framework utilized for this research. The concept of public science will be analyzed along with Thomas Gieryn's concept of Cultural Cartography (CC). This framework also provides a means by which to explain the frequent alterations of the representations of science throughout history (Gieryn, 1999), as well as the multiple descriptions of creationism and evolution present within the evolution-creation controversy literature. This framework is combined with Pierre Bourdieu's concepts of habitus, capital, and field in order to understand how AEC social spaces operate both within their own organizational structures as well as within church and college organizations as well. Bourdieu's framework also allows for an analysis of who the members of these groups and organizations are and how they are able to affect change, work in collaboration with other AEC groups and organizations, and engage in outreach activities.

Chapter five provides the methodology of this research. A step-by-step overview of how different AEC groups and organizations were identified, which methods were utilized in order to contact potential informants, and how interviews were conducted are discussed.

Chapter six provides an analysis of the interviews. Utilizing the theoretical framework provided in chapter four, the interview data will be analyzed for trends and explanations to answer the research questions laid out in chapter five.

Chapter seven is the conclusion chapter where the research questions will be answered and assessed for potential policy applications. In addition, suggestions for further research will also be provided.

Chapter 2: Literature Review

The present literature on the evolution-creation controversy has become fairly standardized with a largely uncontested historical narrative and standard terminology. In order to assess the history and present-day situation of AECs, their organizations, groups, and outreach, it is necessary to critically assess this standardized historical narrative and the terms *creationism* and *creationist*. This allows for an understanding of how AECs, their organizations and outreach are problematized. It also allows for a critical analysis regarding whether or not this conceptualization of AECs and their history is accurate. These aspects of the evolution-creation controversy literature are interpreted utilizing the concept *hegemony*.

2.1 Hegemony

Antonio Gramsci's concept of hegemony is useful to interpret the evolution-creation controversy in four main ways. The first is that, by drawing on the concept of hegemony, defined as "a relation, not of domination by means of force, but of consent by means of political and ideological leadership" (Simon, 1982: 21), the researcher does not necessarily take sides in the controversy. In this analysis, those in a position of hegemony are social groups - in this case the scientific community - which have an official domination over the ideas present within a society and therefore much more authoritative and institutional support. Counter-hegemony is represented by those who seek to overthrow the hegemonic bloc and create their own hegemony within the society. Consequently, labeling the scientific community as hegemonic and the AECs as counter-hegemonic simply recognizes their goals in the evolution-creation controversy, as well as the power imbalance between the scientific community on the one hand, and the AECs, their church and para-church organizations, on the other. Not needing to take positions on ontological issues allows researchers to avoid any interpretative bias in relation to the issues involved. In addition, as the evolution-creation controversy is fundamentally an argument over what constitutes science (Shapin, 2006), such an interpretation is inappropriate as it is not the task of sociology

to identify what science is and is not, especially given the inability of scientists themselves to do so in a consistent or coherent manner (Gieryn, 1999; Shapin, 2007). Nor should sociologists take a professional stance regarding whether or not evolution should or should not be believed in, in part because large disagreements continue regarding what evolution is (Laland, et al., 2014; Jean & Lu, 2018), and a full 13% of scientists reject an evolutionary worldview (Pew, 2009).

Hegemony, however, is easily determined as the scientific community presently has the backing of government funding, the legal system, the mainstream media, and the majority of academics and academic literature (Bleckmann, 2006; Kemp, 2012; Numbers, 2006; Pruett, 1999; Scott, 2009). For example, in the famous court case, *McLean v. Arkansas Board of Education*, Judge Overton made scientific hegemony the legal criterion for his decision regarding what science is. In his decision he “decided that science is what is ‘accepted by the scientific community’ and ‘what scientists do’” (Moore, 1999: 97). AECs, on the other hand, have significantly less legitimacy within Western countries, are typically vilified in the media (Barker, 2004; Harding, 1991), and are dependent upon grass-roots and private religious organizations for their funding (Numbers, 2006, 2011). Despite this, the counter-hegemony of AECs has been incredibly successful in the United States insofar as far more people accept AEC worldviews than evolutionary ones (Angus-Reid, 2012; Gallup, 2014; Hill, 2014; Pew, 2009).

Within the discipline of sociology, this scientific hegemony has been noticeably present whenever scientific and religious understandings are related to one another (Evans & Evans, 2008). Most sociologists who compare religion and science, either in the past or presently, present the two as in fundamental conflict with one another (Evans & Evans, 2008) despite the historically untenable position of such a view (Brooke, 1991; Harrison, 2006; Numbers, 1982). Evans & Evans (2008: 89) suggest that, “The narrative of religion and science in conflict over truth claims is so deeply entwined with sociology that sociological definitions of religion presuppose it, making it almost impossible to find a perspective outside of this tangle from which to analyze the relationship between religion and science.” This a priori assumption of conflict between science and religion, one which scientists will win (ibid.), is likely the reason why

sociologists initially had a “place at the table” (Wotherspoon, 2015: 408) in early conferences in the 20th century where attempts were made to understand the relationship between science and religion (ibid.). More recently, however, “they have not been invited to the table” (Stahl et al., 2002: 2) since the 1990s when such conferences resumed (ibid.). As recently as 2014, some sociologists have begun declaring the existence of a *New Sociology of Religion*, which represents a new way of engaging with the phenomenon of religion without assuming that modernizing societies, which tend to embrace science more, will necessarily have a decline in religiosity (Woodhead, 2014). This new way of systematically understanding religion within the discipline of sociology presents a way of interpreting religion without being necessarily in conflict with scientific understandings.

The second reason why the concept of hegemony is useful is to contextualize the often biased and belittling academic representations of AECs. The standardized format for discussing AECs in the evolution-creation controversy literature is to use stigmatized terms and descriptions for AECs such as: anti-modern, anti-science, overly dogmatic, and extremely ignorant or deceitful (Harding, 1991; Numbers, 2006; Scott, 2009; Simpson, 1961). This has had the harmful effect of scientists outright dismissing AEC arguments and worldviews (Coyne, 2012; Moore, 1999); the scientific community ignoring the anti-religious claims of other scientists and academics (Miller, 2007; Pruett, 1999); and the creation and perpetuation of widely-held myths regarding AEC arguments and worldviews within the scientific community (Numbers, 2011). This treatment of AEC arguments and worldviews serves to negate opportunities for dialogue and inevitably leads to each side, evolutionists and AECs, attacking straw-men opponents rather than engaging with what each side is actually saying (Numbers, 2006).

The third reason why the concept of hegemony is useful is to understand how the hegemonic status of evolutionists has led to the vast majority of the evolution-creation controversy literature identifying all the problematic elements within this controversy existing solely in AEC arguments and worldviews. In other words, the scientific community and scientific popularizers are presented as blameless, and therefore the entire controversy between evolutionists and AECs exists due to attacks by AECs

against scientific teachings. Science is almost universally identified as religiously neutral and as no threat to religious worldviews (Klayman et al., 1986; NAS & IM, 2008; Sager, 2008; Scott, 2009). However, recently a small handful of scientists have begun speaking out about how the scientific community remains silent when atheistic or anti-religious scientists use evolution, and occasionally other scientific theories, to attack religious beliefs based upon their own philosophical interpretation of scientific data (Miller, 2007). As the biologist, Stephen B. Pruetz, has pointed out, “individual scientists and organizations of scientists have been silent on this matter and have let the assertions of anti-religion scientists stand unopposed. Therefore, it is not unreasonable for the public to perceive that scientists are largely united in the view that evolution and cosmology render religion obsolete” (1999: 902). This problem with how science is presented, by many if not most scientific popularizers (Miller, 2007), has been confirmed by subsequent research. Several researchers found that when studying the public’s understanding of science “most people in the public establish a connection between atheism and science, believing that atheism and science mutually support each other” (Johnson et al., 2016: 4).

Lastly, the concept of hegemony makes it possible to understand why public attitudes about belief in evolution are problematized (Coyne, 2012). It is common for large segments of the general public in the U.S. to be scientifically illiterate (Moore, 1999; Pigliucci, 2007; Trani, 2004); indeed this situation is common in many countries around the world (Chinsamy & Plaganyi, 2008). The National Science Foundation has even demonstrated that antievolutionist attitudes are widespread in many countries (2012). In addition, it has been demonstrated repeatedly at the university level that students either do not accept, or do not understand, the theories and concepts of evolution as they are taught in biology courses (Chinsamy & Plaganyi, 2008; Nehm & Reilly, 2007). This has led to a wide array of educated professionals having misconceptions about evolution (Moore & Cotner, 2009; Trani, 2004). Some researchers have noted how “misconceptions of evolution are not restricted only to the public at large, but appear to be present even among a large proportion of college graduates...school teachers themselves are inept at teaching evolution” (Chinsamy & Plaganyi, 2008: 249). Citing a raft of literature, other researchers have explained,

Low levels of evolutionary knowledge and high levels of evolutionary misconceptions are known to be harbored by high school students...undergraduates...biology majors...medical students...and science teachers (Nehm & Reilly, 2007: 263).

As evolution has not been taught to the vast majority of people in the U.S., even at the present time (Scott, 2009; Moore & Cotner, 2009), these findings are not surprising. As the biologist and frequent evolution-creation controversy analyst, Randy Moore, has stated “scientific illiteracy is as American as apple pie; for example, recent surveys show that only about half of the population knows how long it takes Earth to orbit the sun” (Moore, 1999: 334). Given this consistent finding that many people throughout the world, and especially in the U.S., do not understand evolution or science more generally, the reason for its problematization in particular is likely due to AEC outreach and activity. Simply put, the lack of belief in evolution is problematic due in large part to counter-hegemonic activities.

Combating counter-hegemony has also altered how evolution has developed as a scientific concept (Laland et al., 2014), as well as how it is discussed and taught (Ehrlich & Holm, 1963). The emphasis on the public’s “belief in evolution” (Ehrlich & Holm, 1963: 309) is a relatively recent phenomenon which has developed in response to AEC challenges against a hegemonic and “rather stringent orthodoxy” (ibid.). The Stanford biologists, Paul R. Ehrlich and Richard W. Holm, explain that beliefs in a scientific theory should not be relevant for science; instead evolution should be discussed “as a highly satisfactory theory” (ibid.) by the scientific community. The concepts of hegemony and counter-hegemony explain why public belief in evolution, vaccination, climate change, and genetically modified foods are all frequently discussed in the media, but belief in general relativity, quantum mechanics, and Johannes Kepler’s three laws of planetary motion are not. It is only when scientific hegemony is challenged that belief in scientific ideas and theories becomes important. It is also the reason why polling companies are studying public beliefs regarding these issues (Funk & Rainie, 2015) and why the media are “generally fanning the flames of a ‘controversy’ over evolution” (Scott, 2009: 309).

2.2 Hegemonic Anti-Religious Attitudes vs. Counter-Hegemonic Creationism

The use of the terms *creationist* and *creationism* as utilized by both scientists and scientific popularizers clearly demonstrates how the evolution-creation controversy is centered on hegemonic and counter-hegemonic positions. The National Academy of Sciences along with the Institute of Medicine (IM) have defined a “creationist” as “someone who rejects natural scientific explanations of the known universe in favor of special creation by a supernatural entity” (2008: 37). As special creation by a supernatural entity is a common religious belief, and theism is so pervasive in all religious belief systems that some sociologists have suggested it is one of the main factors required for any religious definition (Stark, 2011); the key component of this definition is that it designates those who reject natural scientific explanations for special attention. Another expert on the evolution-creation controversy defined creationism slightly more broadly as “any religious opposition to evolution” (Dixon, 2008: 87). These definitions demonstrate the author’s acknowledgement that the term creationism is utilized as an umbrella term to collectively label all religious worldviews which are counter-hegemonic to science even though many of those worldviews diverge widely from one another (NAS & IM, 2008; Numbers, 2006).

Other scientists, however, have cast even wider nets by singling out, and attempting to problematize, any theistic interpretation of evolution as “unscientific” (Coyne, 2012: 2657), or by suggesting that Christianity itself is completely incompatible with evolution, and is therefore refuted by science (Dawkins, 2011). In this way, the evolution-creation controversy is utilized as an arena for anti-religious scientists to attack religious worldviews based upon their personal philosophies (Miller, 2007). The hegemony of science becomes a cover for scientists not only to dismiss counter-hegemonic viewpoints, but to claim that all theistic religions are counter-hegemonic as well (Coyne, 2012). In 1994 John Maddox, the editor of the science journal *Nature*, made the observation “it may not be long before the practice of religion must be regarded as anti-science” (Rao, 1996: 520). Consequently, in order to understand the evolution-creation controversy one must observe not one, but two, separate yet interconnected social movements occurring simultaneously. The AEC movement is obviously counter-hegemonic, while another movement, where anti-religious scientists use evolution to attack religion, is largely invisible due to its hegemonic status within the

scientific community (Larson & Witham, 1999; Miller, 2007). As Kenneth W. Kemp explains,

Darwinian evolutionary biology has, to be sure, been involved in two ideological wars in recent years...One of those wars was the war that Christian anti-evolutionists have waged against evolution...The second of those wars is the war waged by scientific anti-Christians against religion (Kemp, 2012: 30).

This use of evolution to attack religion has been present within scientific literature since the publication of Charles Darwin's *On the Origin of Species* in 1859 (Miller, 2007; Ruse, 2005; Scott, 2009; Turner, 1978). Following Darwin's publication, there were many scientists who sought to use it as a weapon against the religious institutions of the day in order to further the professionalization of science (Turner, 1978). Consequently, influential scientists, such as T. H. Huxley, intentionally hindered any attempt to reconcile religious beliefs with evolutionary thought (ibid.). Over time, many prestigious biologists such as Ernst Haeckel, G. G. Simpson, E. O. Wilson, Stephen J. Gould, William Provine, and Richard Dawkins continued this tradition of attacking religious beliefs in the supernatural with materialist philosophies which they claim represent a proper understanding of evolution (Barbour, 2000; Miller, 2007; Simpson, 1949). The situation has gotten so out of control at present that the biologist and creationist debater, Kenneth Miller, has stated that "many, if not most, [scientific writers] are frankly inclined to use evolution as a weapon against religion" (2007: 171).

There are many scientists, philosophers, and researchers who study the evolution-creation controversy and recognize a hegemonic anti-religious culture within the institutions of science at present. Experts such as Miller, Michael Ruse, Rodney Stark, and Robert Jastrow have all described a "reflexive hostility of so many within the scientific community to the goals, the achievements, and most specially to the culture of religion itself" (Miller, 2007: 166). This hostility appears to only be present in the upper echelons of the scientific community in the U.S. as there is a massive discrepancy between 'lower tier' scientists, of which 66.7% are religious (Eckand & Scheitle, 2014), and the astoundingly low percentage of religious believers in the self-selecting National Academy of Sciences, of which only 7% hold religious beliefs (Larson & Witham, 1999). Stark, the eminent sociologist of religion, describes the institutional mechanisms which have resulted in this situation stating, "in research universities, 'the religious people

keep their mouths shut...And the irreligious people discriminate. There's a reward system to being irreligious in the upper echelons'" (Larson & Witham, 1999: 91). Miller (2007: 269) also explains how this anti-religious culture in the sciences is hegemonic, stating,

Questions about good and evil, about meaning and purpose of existence, the sorts of things that have busied philosophers since ancient times, have no place in science, because they cannot be addressed by the scientific method. By what logic, then, do so many invoke science when they presume to lecture on the pointlessness of existence? Something is not quite right. Apparently it is fine to take a long, hard look at the world and assume scientific authority to say that life has no meaning, but I suspect I would be accused of anti-scientific heresy if I were to do the converse, and claim that on the basis of science I had detected a purpose to existence.

2.3 Creationism

Although the terms *creationism* and *creationist* as utilized in the evolution-creation controversy clearly represent identifiable counter-hegemony against accepted scientific disciplinary findings (Dixon, 2008; NAS & IM, 2008), the terms are usually not defined in such a clear and concise manner. The terms have no standard definition among the many authors who utilize them so almost all researchers who study the evolution-creation controversy define, discuss, and break down the terms differently. Some provide multiple definitions for the term *creationism* (Colburn & Henriques, 2006; Ruse, 2005; Scott, 2009), while others utilize a single definition while recognizing the ambiguity of the term by acknowledging that there are many different forms of creationism (NAS & IM, 2008; Scott, 2009). Unfortunately, there is a growing trend of utilizing a single definition or description of creationism in order to validate the representation of all creationists' worldviews into a single set of wholly inaccurate doctrinal claims (NAS, 1984; Root-Bernstein & McEachron, 1982).

Some researchers explicitly mention the problem of creating or utilizing a single definition of creationism stating how "science educators may sometimes think of creationism as a single set of beliefs. The creationist community, however, is not unified in their views" (Colburn & Henriques, 2006: 421). Even this description is misleading as there is nothing resembling a 'creationist community' (Numbers, 2006). This attempt to promote a single definition of the term, given the ambiguity of the

phenomena it represents, appears to be an attempt to create a straw-man of AEC. Through the construction of a single, inaccurate and taboo label, both scientists and the public can immediately determine who is 'untrustworthy' or lacking 'credibility' within the evolution-creation controversy. Examples of such tactics are easily found in the available literature concerning AECs (Scott, 2009). For example, some experts and commentators have gone to great lengths to apply such a label of 'creationism' to the Intelligent Design movement, referring to it as "intelligent design creationism" (Scott, 2000: 815). This serves to effectively lump Intelligent Design in with all the other forms of creationism despite how "Intelligent Design proponents do not refer to themselves as creationists" (Scott, 2009: 134) and how other experts have pointed out that intelligent design has little in common with other forms of creationism (Numbers, 2011).

The terms *creationism* and *creationist* are generally utilized in three different ways within the scientific and public vernaculars. They have a common vernacular meaning, a scientific vernacular meaning, and a meaning specific to discussions and research involving the evolution-creation controversy. The public vernacular meaning is the broadest, as well as the most widely known and utilized by a wide variety of religions (Scott, 2009). Creationism refers to "anybody who asserts that the universe was originally formed by a sentient being...Such a designation is very broad, ranging in application from those who believe in a spiritual power that has now abandoned the world to those who maintain faith in an active and omnipotent deity. It also leaves open the question of when, and in what form, life was originally created" (Coleman & Carlin, 2004: 3). Eugenie C. Scott, the former executive director of the National Center for Science Education, defines creationism in this manner as "the idea of creation by a supernatural force" (2009: 57). This use of the term creationism includes a vast array of religious beliefs while revealing nothing regarding whether or not those particular religious beliefs contradict scientific understandings.

As this is by far the most common definition available to the public, the other uses of the term creationism would necessarily be confused with it. Consequently, when scientists and evolutionists condemn or attack the concept of *creationism* or *creationists*, especially when they do not clearly define how they are utilizing the term (Curry, 2009; Moore, 1999), such statements could easily appear to be seen as

attacking religious beliefs in general and contribute to the already assumed anti-religious culture of the sciences (Johnson et al., 2016; Larson & Witham, 1999; Scheitle & Ecklund, 2015). While attacking all religious conceptions of creationism is occasionally a correct interpretation of what evolutionists are attempting to do (Coyne, 2012; Miller, 2007; Ruse, 2005), the vast majority of scientists commenting on the evolution-creation controversy do not consider the religious idea of creationism to be in conflict with scientific knowledge (Klayman et al., 1986; NAS & IM, 2008). This is the case within many different countries as well,

A 2009 British Council poll in 10 countries finds that perception of conflict between evolutionary worldviews and belief in God is a minority view...a finding consistent with research among the US public...college students...and academic scientists (Johnson et al., 4).

Another manner in which creationism is utilized is in the scientific vernacular. In this case the term *creation* is taken to mean “the origins of organisms (or anything else, for that matter)” (Ruse, 2005: 4) or “the origination of life, new species, etc” (Colburn & Henriques, 2006: 438). This use of the term references a completely different set of phenomena and ideas when compared to the public vernacular use; it is only utilized to refer to scientific data and findings. While public vernacular use refers to religious understandings, the scientific vernacular use is only applied in reference to scientific, or strictly material, understandings (Miller, 2007).

Lastly, the main use of the term *creationist* within the evolution-creation controversy is to designate, and thereby problematize, any counter-hegemonic religious argument or worldview. In this way it blends both the public and scientific vernacular uses of the term together but only refers to the areas where the two vernaculars overlap and contradict one another (NAS & IM, 2008). However, specific definitions of creationism provided by evolutionists are usually unstandardized, leading to a growing morass of definitions and descriptions which are often uninformed or dependent upon myths about AECs. For example, one description of creationism claimed it “usually refers to a package of anti-evolutionist beliefs held by religious believers, most often Christian, and usually both evangelical/fundamentalist and Protestant” (Coleman & Carlin, 2004: 3-4). Others claimed it can mean “the specific, biblically based religion of many (especially American) evangelicals – six days of creation, miracles needed to

make species, humans given form last, universal flood, and so forth” (Ruse, 2005: 4-5), or that “God created the universe essentially as we see it today, and that this universe has not changed appreciably since that creation event...that God created living things in their present forms, and it reflects a literalist view of the Bible” (Scott, 2009: 57).

The problem with many of these representations of creationist counter-hegemony is that almost all of them are either misleading or factually inaccurate. For example, antievolutionist beliefs are not specific to any given religious denomination or type of Christianity and are no longer restricted to Christianity either (Numbers, 2006). One U.S. national poll found that 46% of religious individuals find that the theory of evolution is inconsistent with their beliefs (Gallup, 2014), so to restrict descriptions of creationism to only certain types of Christianity in the U.S. can be very misleading. The researcher Jonathan Hill found that only 8% of the U.S. adult population is certain in their belief in a historical Adam and Eve and a literal six-day creation event (2014: 8) so the vast majority of AECs do not share beliefs consistent with a young Earth. As to creationist beliefs in an unchanging universe, these are simply false myths as most of the major AEC organizations accept some form of evolution and believe that the world has changed a lot since it was originally created (Numbers, 2011). The National Academy of Sciences and the Institute of Medicine have recognized that AECs do not necessarily hold biblically literalist views (2008), and others have pointed out that not all AECs believe in a universal flood or a six-day creation event (Scott, 2009). As a consequence of both poor research and widely held myths, the vast majority of these definitions and descriptions of a creationist counter-hegemony serve to confuse rather than clarify what AECs believe.

These inaccurate, misleading, and overgeneralized singular definitions of creationism also serve a very specific purpose as well. It has served to create a stigmatized AEC straw-man (NAS, 1984) specifically for the purpose of undermining any basis of trust and credibility among the scientific community. It is this negation of trust and scientific credibility which has provided the groundwork for the vast majority of scientists to simply dismiss AEC arguments and worldviews as untrustworthy, and thereby negate any meaningful dialogue from occurring between the two sides of the evolution-creation controversy (Moore, 1999; Numbers, 2006). This tactic of complete

dismissal, based largely on unsubstantiated myths and overgeneralizations, is not new among eminent scientists and has been utilized to holistically attack and reject other areas of understanding such as the sociology of scientific knowledge. As Steven Shapin (1995: 293) explains,

Quite recently, small numbers of eminent natural scientists have become aware of SSK [the sociology of scientific knowledge], and, cavalierly neglecting crucial differences in tone and intent among practitioners, have sought to expose them all as motivated by hostility to science, purportedly animated by hidden political agendas...Alleged crises in public confidence in, and support for, science have been traced – incredible as it may seem – to the sinister influence of SSK and follow-traveling philosophy of science.

Shapin has written extensively on how “trust,” and therefore “credibility” (1988: 375-376) are essential components to both building and maintaining systems of scientific knowledge. This is the case just as much at the present time as it was when the first experimental programs were being designed by Robert Boyle in the early 17th century (Shapin, 1988). The main difference between then and now is that the credibility of scientific claims is now underwritten by scientific hegemony (Moore, 1999; Pennock, 2011), such that when the majority of scientists dismiss their opponents for any variety of reasons (Gieryn, 1999), their claims to scientific trust or credibility is destroyed as well (Scott, 2009). Shapin (1988: 404) describes how the present situation underwriting scientific credibility is necessarily perceived to involve the hegemonic scientific community stating,

Public assent to scientific claims is no longer based upon public familiarity with the phenomena or upon public acquaintance with those who make the claims. We now believe scientists not because we know them, and not because of our direct experience of their work. Instead, we believe them because of their visible display of the emblems of recognized expertise and because their claims are vouched for by other experts we do not know. Practices used in the wider society to assess the creditworthiness of individuals are no longer adequate to assess the credibility of scientific claims.

2.4 Types of Creationism

There are widely agreed-upon types of creationism which exist in the vernacular of the evolution-creation controversy. While AEC groups and organizations are often collectively referred to as “creationism” (Scott, 2009: 57), there is a wide variety of

particular creationist worldviews which have been grouped into types. This typology is often recognized and utilized both by researchers and by AECs themselves (Numbers, 2006; Scott, 2009). The types of AECs are based upon how literally they interpret their scriptures. Some groups are in conflict with a wide array of scientific disciplines (Scott, 2009), while others might be in conflict with only certain aspects of evolution (Bock, 2007) and these positions of conflict are frequently shifting over time (Numbers, 2011). There are also grey areas of creationism where religious individuals interpret evolution in a theistic manner but in such a way so as to not contradict scientific findings and conclusions (Collins, 2006; Scott, 2009). Some experts refer to this as creationism (Scott, 2009), while others clearly differentiate such positions from AECs (Hill, 2014).

Scott's typology begins with the most literalist biblical interpretations, which reject most scientific findings, and proceeds through to the most liberal creationist position, which accepts all scientific findings. Her typology includes: Flat Earthism, Geocentrism, Young-Earth Creationism, Gap Creationism, Day-Age Creationism, Progressive Creationism, Evolutionary Creationism, and Theistic Evolutionism (Scott, 2009). These types can be grouped together into those who: 1) "reject virtually all of modern physics and astronomy as well as biology" (Scott, 2009: 65); 2) those creationists who accept most modern scientific findings but still reject biological evolution in whole or in part; and 3) those who accept all the findings of modern day science and still believe the universe and everything in it was created by a supernatural force (Scott, 2009).

The first group of creationists reject the findings of a wide variety of scientific disciplines. They include: Flat Earthism, Geocentrism, and Young-Earth Creationism. Belief in a flat Earth derives from a particular literalist reading of the Bible. It is supposedly a rare position to take as "few other biblical literalists hold to such stringent interpretations of the Bible" (Scott, 2009: 64). Despite this interpretation, a recent nationally representative poll of the U.S. population found that, while only 4% of the population believe in a flat earth, 16% of the population is skeptical or doubtful of a round earth too (Dean, 2018). Belief in a literal flat earth is a view held by the International Flat Earth Research Society, which has a claimed membership of 3,500 people (ibid.). It is also a view held by a surprising number of National Basketball Association players, including Shaquille O'Neal (Rohrbach, 2017). This belief

represents the smallest minority of creationist beliefs and is hardly mentioned in AEC or evolution-creation controversy literature.

Geocentrism is another biblically based belief that the Earth does not orbit around the sun. There is ambiguity among these believers as to whether they believe Earth is the center of the universe or the solar system, or if it is simply the sun which rotates around the Earth. While Scott claims that “geocentrism is a[n]...insignificant, component of modern antievolutionism” (2009: 65), it is possible that it plays a much larger role than previously guessed. According to data collected by the NSF, 27% of Americans and 44% of people living in the E.U. are Geocentrists (2012). Whether these beliefs are biblically based or whether they are linked with antievolutionist beliefs remains to be determined.

Young Earth Creationists are by far the largest type of creationist presently existing in both Canada and the U.S. (Barker, 2004; Angus-Reid, 2012). In the U.S. they represent between 42% (Gallup, 2014) and 66% (Gallup, 2014) of the American population. In other countries such as Canada they represent 22% of the population, while in Britain they represent 17% of the population (Angus-Reid, 2012). In addition, Young Earth Creationists also have the largest dedicated organizations, resources, and funding, which has allowed them to expand many of their organizations globally (Numbers, 2006). This type of creationist usually believes in a very young Earth and universe, between 4,000 and 10,000 years old, depending upon how they calculate a biblical creation event utilizing a combination of both historical and biblical sources (Scott, 2009). Consequently, as one biologist put it, Young Earth Creationism “requires a full frontal assault on virtually every field of modern science” (Miller, 2007: 81). They are also the most likely to be challenging the teaching of evolution in science classes and have therefore had their worldviews challenged in many court cases in the 1980s (ibid.). Although they must necessarily reject the findings of many different scientific disciplines (NAS & IM, 2008), their primary focus has been to discredit, and prevent the teaching of, evolution (Numbers, 2006).

Despite rejecting the findings of so many disciplines of science, Young Earth Creationists do not view themselves as anti-science (Ham & Hall, 2012). Instead many

of them conceptually carve up the natural sciences into arenas that they accept and other arenas that they do not. For example, Ken Ham, the president and founder of the massive Young Earth Creationist organization, Answers in Genesis, makes a distinction between what he refers to as “historical science” and “observational” or “operational science” (Ham & Hall, 2012: 48). Historical science is defined as “knowledge based on certain assumptions about the past” (ibid.) and is therefore fallible as it cannot be demonstrated empirically to be irrefutably true. However, Young Earth Creationists do not reject all historical science. Ham explains how “we also love historical science, but only when the assumptions used to understand the past are firmly rooted in what God has revealed to us in the Bible” (Ham & Hall, 2012: 48-49). Operational science, on the other hand, is knowledge gained through empiricism and direct experiments. Ham claims that “this is the knowledge that enables us to build our technology, understand how a cell works, and develop medicines” (ibid.). Consequently, “creationists and evolutionists both have the same operational science but different accounts of origins based on the assumptions in their methods of historical science” (Ham & Hall, 2012: 48).

The second group of creationists accept most scientific understandings but still reject evolution in whole or in part. They include: Old Earth Creationists, Progressive Creationists, and Evolutionary Creationists. The Old Earth Creationists are those creationists who “accept most of modern physics, chemistry, and geology” however “they are not very dissimilar to YECs in their rejection of biological evolution” (Scott, 2009: 68). This grouping of creationists collectively represents a myriad of differing theological and scientific combinations. They include Gap Creationism, which claims a large temporal gap between verses 1 and 2 of the first chapter of Genesis and, consequently, two different creation events. Another type is Day-Age Creationism which claims that the days written of in Genesis are actually long periods of time. Scott explains how “this allows for recognition of an ancient age of Earth but still retains a quote literal interpretation of Genesis” (ibid.). Day-Age Creationism was the most popular AEC position in the late 19th and early 20th centuries (Numbers, 2006; Scott, 2009) and Old Earth Creationism, in general, was the most popular AEC position until the 1960s (Numbers, 2006).

Progressive Creationists accept all the findings of the natural sciences except for evolution (Scott, 2009). It is these types of creationists who are specifically antievolutionist in their worldview. Their major objection to evolution is that each individual kind of plant and animal cannot evolve into a different kind; in other words, certain kinds of plants and animals cannot become other kinds of plants and animals (ibid.). This distinction is often referred to as “microevolution,” in contrast to “macroevolution” (Miller, 2007: 108), where microevolution refers to small mutations and adaptation, such as the flu virus mutating, and macroevolution involves new species appearing. In this way, some AECs claim microevolution is acceptable but macroevolution can be rejected (ibid.). Despite how many experts claim that this distinction between ‘micro’ and ‘macro’ evolution is nonsense (Scott, 2009), the National Academy of Sciences and the Institute of Medicine both utilized this distinction to interpret biology in their joint publication (2008).

The last form of creationism which contradicts accepted scientific findings in the natural sciences is Evolutionary Creationism. These creationists accept almost all of the findings of the natural sciences, including evolution, but their theological interpretations dictate that God is more directly involved throughout history than the natural sciences show. Consequently, they go beyond simply interpreting scientific findings with their theology, and instead occasionally dispute scientific conclusions as well (Scott, 2009). This version of AEC is the most liberal of them all.

The remaining two versions of creationism, Theistic Evolution and Intelligent Design, are disputed regarding whether they are anti-evolutionist or anti-scientific positions. Many scientists claim that Theistic Evolution is compatible with scientific understandings (Collins, 2006; Scott, 2009), while others claim it is incompatible (Coyne, 2012; Ruse, 2005). Theistic Evolution claims that God creates through natural processes revealed by scientific investigation. Consequently, those who adopt this stance theologically interpret scientific findings but they never contradict scientific findings; in other words, they intentionally avoid being counter-hegemonic in their approach. Theistic Evolutionists vary in their interpretations of whether God can engage with the natural world and how this can occur, but they are careful not to contradict accepted scientific conclusions. According to the National Academy of

Sciences, theistic evolution “is not in disagreement with scientific explanations of evolution. Indeed, it reflects the remarkable and inspiring character of the physical universe revealed by cosmology, paleontology, molecular biology, and many other scientific disciplines” (1999: 7). It is also “the view of creation taught at the majority of mainline Protestant seminaries, and it is the position of the Catholic Church” (Scott, 2009: 70); therefore, as one might expect, most clergy in the U.S. have adopted this view (Colburn & Henriques, 2006). In total, Theistic Evolution represents the beliefs of 31% of people in the U.S. (Gallup, 2014), and, according to a 1991 Gallup poll, roughly 40% of scientists in the U.S. have also adopted this position (Witham, 1997).

Despite Theistic Evolution’s widespread adoption both inside and outside of science, there have still been those who have claimed that it is counter-hegemonic to science. The biologist Jerry Coyne has claimed that Theistic Evolution “is also unscientific because biologists see humans, like every other species, as having evolved by purely natural processes” (Coyne, 2012: 2657). While it is certainly true that a 1991 Gallup poll found that 55% of scientists interpret evolution in a strictly materialistic manner (Shapin, 2007; Witham, 1997); “40% of biologists, mathematicians, physicians, and astronomers include God in the process [of evolution]” (Witham, 1997). Another study of elite evolutionary scientists who had been elected to membership in twenty-eight honorific national science academies around the world found that “23 percent said organisms have both material and spiritual properties” (Graffin & Provine, 2007: 295). As such, it is safe to conclude that Coyne’s attempt to label Theistic Evolution as an AEC position is simply a disguised attempt to attack all religious interpretations of scientific understandings as being counter-hegemonic to science.

The last creationist position is Intelligent Design, which is an ambiguous form of creationism that seeks to look for evidence of indicators that the universe and life within it have been designed by an unidentified designer (Scott, 2009). As Hill explains, “Intelligent design is often classified as a creationist position, but in many ways it falls outside of the typical categorizations,” however it “clearly has a creationist genealogy” (Hill, 2014: 9). Intelligent Design advocates make no explicit reference to the Bible or any other religious scripture in their writings, and consequently do not match any creationist definition provided in the evolution-creation controversy. Intelligent Design is

not explicitly counter-hegemonic to scientific understanding, nor does it seek simple theological interpretation of scientific data and findings as Theistic Evolutionists do (Hill, 2014).

The reason it is usually treated as counter-hegemonic by scientists and scientific popularizers is due to how some advocates of Intelligent Design have proposed scientific theories, as well as mathematical and philosophical arguments, which attempt to reinterpret scientific conclusions and propose a theistic framework for scientists to utilize (Miller, 1999; Scott, 2009). Besides this occasional counter-hegemony, there are few links between Intelligent Design and the other AEC worldviews (Numbers, 2011). The Intelligent Design movement continuously makes counter-hegemonic arguments and concepts to support their positions and, with few exceptions (Park, 1997), it has not been shown to use the same arguments once they have been scientifically or logically refuted (Numbers, 2006). Another reason why the Intelligent Design movement is considered by many to be an AEC worldview is due to how some of its advocates attempted to introduce the concept into high school science classrooms in the early 21st century (Scott, 2009). However, this was only a single isolated incident and it was not supported by the flagship organization, the Discovery Institute, nor did it involve any instruction in Intelligent Design (Meyer, 2017).

Nevertheless, Intelligent Design is often lumped together with other AEC groups and organizations (NAS & IM, 2008). Scott claims “on careful inspection, intelligent design proves to be a rebranding of creationism – silent on a number of creation science’s distinctive claims...but otherwise riddled with the same scientific errors and entangled with the same religious doctrines” (Branch & Scott, 2009: 95). This misleading claim can be made based not on what Intelligent Design organizations actually say or argue, but rather, purely on membership, an obscure textbook, and the actions of a minority of Intelligent Design adherents (Meyer, 2017; Numbers, 2011). Intelligent Design is often viewed as a “proverbial big tent” (Scott, 2009: 133) for AECs with many different worldviews but none of its official positions are necessarily incompatible with evolution (Numbers, 2011). As Scott has pointed out, “the range of scientific opinion within the ID camp...runs from young-Earth creationism to mild forms of theistic evolution” (Scott, 2009: 133). As one researcher explained, “some leading

proponents of intelligent design, such as the biologist Michael Behe, clearly do accept human evolution” (Hill, 2014: 9); meaning that it is possible to be both a believer in evolution and an Intelligent Design proponent. Others have noted that “ID supporters generally do not characterize themselves as creationists” (Colburn & Henriques, 2006: 436). In other words, Intelligent Design advocates do not, in general, identify as AECs (ibid.), they do not get along with many other AEC groups and organizations, and their worldview, the worldviews of its membership, their arguments, and their overall engagement with science clearly distinguishes them from all other AECs (Numbers, 2011). Despite this, many evolutionists do their best to lump them together with other AECs by labelling them “intelligent design creationists” (NAS & IM, 2008: 40). One of the rare polls which specifically asked about ID found that 31% of Americans are Intelligent Design proponents (Gallup, 2005).

2.5 The Evolution-Creation Controversy

The evolution-creation controversy is a roughly century-and-a-half dispute between religious creationists and evolutionists. For most of its history it involved small groups of religiously motivated individuals who sought to limit or prevent the adoption and teaching of evolution (Numbers, 2006). Due to the success, organization, and impact of AECs in the United States since the 1920s, “creationism is usually perceived as a specifically North American phenomenon...an offshoot of conservative Protestant movements based in the United States” (Coleman & Carlin, 2004: 2). However, the AEC movement was spreading internationally since the 1920s (Numbers & Stenhouse, 2004), and since the turn of the 21st century, it has truly become an international, as well as a multi-religious, social movement (Numbers, 2006, 2011).

The evolution-creation controversy is commonly recognized as beginning when Charles Darwin published his famous book *On the Origin of Species* in 1859 and the myriad of predominantly Christian religious individuals, groups, and organizations, as well as scientists themselves, attempted to interpret these new ideas (Ruse, 1975; Zimmerman & Loye, 2011). This was not an easy endeavor as evidenced by how Darwin himself alternated his interpretations between creationist and non-creationist evolutionary interpretations (Numbers, 2006). Many early evolutionists attempted to

either hinder or prevent theistic interpretations of evolution (Turner, 1978). Darwin's ideas did unsettle many, as "the majority of late-19th-century Americans remained true to a traditional reading of Genesis" (Numbers, 1982: 538). However, the religious oppositions to these new ideas were neither uniform, nor were they clearly distinct from the form science and religion debates took thirty years prior to the publication of Darwin's book (Ruse, 1975). There were even religious leaders who praised evolution as providing them with new theological insight (Brooke, 1998). In addition, many of the objections of religious leaders to evolution came in the form of scientific objections to Darwin's theory. For example, the now iconic 'religious' opposition by the Bishop of Oxford, Samuel Wilberforce, to Darwin's theory was purely scientific, recognized as such by Darwin himself (Dixon, 2008). The philosopher and historian of science Michael Ruse (1975: 520) explains,

There were, however, no objections to Darwin's demands for vast time-spans and the like. Rather, the theory was rejected as a scientific theory because of its supposed inconsistency with such facts as the fossil record and so on....by virtue of Wilberforce's celebrated clash with Huxley at the British Association, he was usually taken to be the archetypal religious opponent of Darwinism. There was no place at all for crude biblical literalism in Wilberforce's response. His religious objections, he admitted openly, stemmed from Darwin's treatment of man and final causes, and his arguments against Darwin's theory were purely scientific.

Prior to the 1920s, antievolutionist activities remained limited to small groups of AECs which had little organization and were, for the most part, singular individuals with a modest following (Numbers, 2006). There was no concentrated "militant opposition to evolution" (Larson, 1987: 89) and the religious opposition to evolutionary ideas was confined to only a few major protestant denominations, with minority groupings of AECs found elsewhere (Numbers, 2006). During this time AECs "may not have liked evolution, but...few, if any, saw the necessity or desirability of launching a crusade to eradicate it from the schools and churches of America" (Numbers, 2006: 53). In addition, AECs during this period agreed with much more of the established findings of the natural sciences than they do at present as most held viewpoints similar to Theistic Evolution (Numbers, 2006). Clerical professors of science who rejected evolution would still generally agree with the vast majority of scientific findings (ibid.). In fact, it was rare to find any creationists prior to the 1960s who "insisted on the recent appearance of all

living things in six literal days, who doubted the evidence of progression in the fossil record, and who attributed geological significance to the biblical deluge” (Numbers, 2006: 24); such Young Earth Creationist positions have since become the majority position among AECs in both Canada and the U.S. (Barker, 2004; Harrold, Eve & Taylor, 2004).

It was during the 1920s that a definitive “antievolution movement became organized, active, and effective” (Scott, 2009: 97). What essentially occurred was that the burgeoning fundamentalist religious movement, which was not originally an antievolutionist movement (Larson, 1987; Scott, 2009), came to adopt a predominantly antievolutionist stance through the advocacy of a prominent fundamentalist leader, William Jennings Bryan (Larson, 1987). This antievolutionist stance adopted by such a popular religious movement caused antievolutionist ideas to spread rapidly across the U.S. (Numbers, 2006). AEC organizations such as the World’s Christian Fundamentals Association, the Anti-Evolution League of America, the Bryan Bible League, and the Anti-False Science League of America were all initial attempts to institutionalize this new antievolutionism within the U.S. (ibid.). This institutionalization occurred for many different reasons, some of which are still being uncovered (Shapiro, 2008), but the main cause is almost universally accepted to be Bryan’s advocacy (Davis, 2005; Numbers, 2006; Scott, 2009). He began an antievolutionist crusade in 1921 by giving a popular and influential lecture on “The Menace of Darwinism” (Numbers, 2006: 57). Another historian describes how antievolutionism was catapulted into the national spotlight just one year later “with the front-page publication of William Jennings Bryan’s antievolution editorial in the New York Times on February 26, 1922” (Shapiro, 2008: 429).

Interestingly, despite Bryan’s assumed agreement with bans on the teaching of evolution given his involvement in campaigning for and defending antievolution educational policies, resolutions, and laws in the early 1920s (Larson, 2006), his goal was not to ban the teaching of evolution in schools. The historian Edward J. Larson (2006: 47) quotes Bryan advocating for a 1923 antievolution law stating, “‘Please note,’ he explained, ‘that the objection is not to teaching the evolutionary hypothesis as a hypothesis, but to the teaching of it as true or as a proven fact.’” In other words, Bryan did not wish to outlaw evolution. Instead, he wished to prevent scientists and science

teachers from utilizing unsubstantiated, and potentially unscientific, rhetoric in order to convince their students that they need to believe in it (Jean & Lu, 2018). It is interesting to note that throughout the 20th and 21st centuries, scientists and scientific popularizers have continued to use exactly this type of rhetoric to convince the public to believe in evolution (ibid.).

Bryan's campaigning led to thirty-seven antievolution bills being introduced into twenty state legislatures between 1921 and 1929 (Zimmerman & Loye, 2011), of which only a few were passed into law (Scott, 2009). The passing of these antievolution laws motivated the American Civil Liberties Union (ACLU) to challenge one, the Butler Act, which led to the now famous Scopes 'Monkey' Trial in Dayton, Tennessee in 1925 (ibid.). During this trial John T. Scopes, a young science teacher, was put on trial for violating the Butler Act by teaching evolution to his students. The ACLU hired Clarence Darrow to defend Scopes and the prosecution was led by Bryan. The trial was sensationalized by the media and was afterwards hailed as a defeat of AEC worldviews (Harding, 1991; Moore, 1999). However, this interpretation is very misleading as "Scopes lost; the antievolution laws remained on the books, and even increased in number" (Scott, 2009: 103). In addition, evolution drastically began to disappear from science classrooms across the U.S. AEC groups and organizations would change their tactics by lobbying state and local school boards, as well as textbook publishers, to remove all mention of evolution from biology curriculums and materials (Scott, 2009), so that, "by 1930, only five years after the Scopes trial, an estimated 70 percent of American classrooms omitted evolution...and the amount diminished even further thereafter" (Scott, 2009: 103). As for teaching evolution, the Nobel laureate and famed evolutionary biologist, H. J. Muller wrote,

A study published in 1942 by the Commission on the Teaching of Biology of the Union of American Biological Societies showed that even then less than half of the high school teachers of biology taught evolution as the principle underlying the development of all living things. There has been little evidence of improvement since that time (Muller, 1959: 308).

It is popular among some experts and authors to describe AECs during this period, between the 1930s and the 1960s, as not being active (Scott, 2009). While it is undoubtedly the case that AEC organizations became much larger and more influential

after the 1960s (Numbers, 2006), it would be a mistake to conclude that following their policy and limited legal successes they were mostly inactive. Numbers explains how “until recently most historians have alleged that fundamentalism lost its vitality after the embarrassing Scopes trial in 1925...However...the absence of media attention can be deceiving” (Numbers, 2006: 120). AECs were actively working to remove evolution from ever more school curriculums and textbooks during this period (Scott, 2009). Several regional AEC organizations, such as the Deluge Geology Society in the U.S. and the Evolution Protest Movement in Britain (Numbers, 2006), were in operation during this time, printing newsletters, organizing conferences, publishing books, opening chapter organizations in other countries, and perhaps most visibly, supporting several successful AEC debaters and speakers, such as the incredibly influential Harry Rimmer, who were touring through different cities in the U.S (Numbers, 2006). Numbers (2006: 120-121) further elaborates upon this period of supposed inactivity explaining how,

After the 1920s, fundamentalists did indeed tend to abandon their efforts to banish modernism from the established churches and to outlaw evolution in public schools. But rather than surrendering, they turned their energies toward developing a separate institutional base from which to evangelize the world: radio ministries, colleges and the all-important Bible institutes, the greatest of which was the Moody Bible Institute of Chicago. With respect to evolution, they turned from lobbying state legislatures to pressuring local school boards; and, despairing of ever converting the scientific community to their way of thinking, they set about to create their own alternative societies and journals.

In the early 1960s, both an AEC and an evolutionist revival would occur almost simultaneously. While it is common for evolutionists to claim the AEC revival was a response to the reintroduction of evolution to high school science classes (Scott, 2009; Zimmerman & Loye, 2011), none of these authors have presented any direct evidence for this supposed link. The “creationist revival” (Numbers, 1982: 542) began in 1961 with the publication of Henry M. Morris and John Whitcomb’s book *The Genesis Flood*, which appeared to be a direct reaction to the liberalization of AECs, especially those involved with the American Scientific Affiliation (Numbers, 2006). The success of this book allowed for the development of the largest and most influential national and international AEC organizations today, all of which adopt Young Earth Creationist worldviews: the Creation Research Society founded in 1963, the Institute for Creation Research in 1972, and Answers in Genesis in 1994 (Scott, 2009). In Canada, the

revival also led to the establishment of the first two Canadian AEC organizations, the North American Creation Movement in 1969 and the Creation Science Association of Canada at roughly the same time (Barker, 2004). While these developments coincided with the reintroduction of evolution into the high school curriculum and textbooks, and this occurrence likely influenced the AEC revival, it was not until 1963, two years after the revival had begun, that the National Science Foundation's Biological Science Curriculum Study had begun to reintroduce evolution back into high school biology textbooks (Scott, 2009). They had done so because, when they reviewed the status of high school biology textbooks in the late 1950s, "they were shocked to discover the poor quality of extant textbooks. Evolution, the foundation of biology, was absent from almost all of them" (Scott, 2009: 104).

This 1960s AEC revival drastically altered the AEC landscape in terms of popular worldviews. Flood Geology, a common belief in Young Earth Creation, soon became the most popular AEC worldview even though it had been promoted and was the subject of previous publications for almost sixty years prior to *The Genesis Flood* (Numbers, 2006). Consequently the revival was not due to new ideas; the worldview they promoted had been considered and largely rejected by American Scientific Affiliation members over the past decades (ibid.). While reactions against the Biological Science Curriculum textbooks no doubt played a part, it was likely the convincing and updated arguments as well as the intelligent promotion of the book which led to the wide adoption of Flood Geology (Numbers, 2006). In their book Henry M. Morris and John Whitcomb had actually updated and repackaged George McCready Price's Flood Geology, which Morris had published books about since 1946 (Scott, 2009) and Price had published since the early 1900s. Prior to the 1960s, however, this version of AEC had only a small number of adherents (Numbers, 2006). 'Pricean' Flood Geology conflicted with much more than just evolution; it contradicts many scientific disciplines such as astronomy, astrophysics, nuclear physics, geology, geochemistry, and geophysics (NAS, 1999) by claiming a literal six-day creation, a Noachian flood, and a universe no older than 10,000 years (Scott, 2009). Numbers (2006: 8) explains how the 1960s revival altered the AEC landscape,

It was not until the creationist renaissance of the 1960s, marked by the publication of Whitcomb and Morris's *Genesis Flood* and the subsequent birth of the Creation Research Society, that fundamentalists in large numbers began to read Genesis in the Pricean manner and to equate his views with the intended message of Moses. By the 1980s the flood geologists had virtually co-opted the name creationism to describe the once marginal views of Price.

The AEC revival and the organizations it helped to create led to a much wider influence for AEC worldviews. In addition to the traditional forms of outreach already discussed, AEC organizations were now able to establish accredited post-secondary schools and degree-granting programs, provide workshops, summer camps, have radio shows broadcast nationwide, provide educational materials, mail literature, establish alternative peer-reviewed journals, publish their own books, create movies and documentaries, open museums and parks, establish research institutes, and eventually establish chapter organizations in almost every region in the world (Numbers, 2006; Scott, 2009). The revival led to a period of continuous growth and influence which has continued until the present (NAS & IM, 2008; Scott, 2009).

The reintroduction of evolution into the high school curriculum and textbooks, combined with the 1968 U.S. Supreme Court decision, *Epperson v. Arkansas*, which struck down all the remaining antievolution laws in the U.S. (Scott, 2009), as well as a resurgence of popularity among AECs for Flood Geology led to a change of tactics to combat evolution in high school classrooms. As removing evolution from school curriculums and textbooks was no longer a viable option, nor was outlawing the teaching of evolution, many AEC organizations chose to emphasize the claimed scientific foundations of their Pricean Flood Geology as 'Creation Science' following the publication of Morris' book *Scientific Creationism* in 1974 (Scott, 2009). While the vast majority of AEC leaders had always claimed that their worldviews were based on science (Numbers, 2006; Shapin, 2006), and some AECs had proposed using the term "scientific creationism" many years earlier (Numbers, 2006: 201), this time the term stuck. The inability to outright ban evolution from high school science classrooms led AECs to push for "equal time" or "balanced treatment" (Scott, 2009: 111-113) legislation between evolution and scientific creationism/creation science (Numbers, 2011).

Several AECs had been petitioning state boards of education for equal time policies since 1963 (Scott, 2009), but this tactic would become favored following the *Epperson* court decision leading to equal time legislation being introduced in at least twenty-seven states by the early 1980s (ibid.). Despite this large push “all died in committee, except for those in Arkansas and Louisiana” (Scott, 2009: 113) thanks to the counter-campaigns organized by scientists and educators (Scott, 2009). Legal challenges to both these laws would result in the 1982 court case *McLean v. Arkansas Board of Education*, followed by the 1987 *Edwards v. Aguillard* court case. The former would challenge the legality of the Arkansas equal time law, while the latter would do the same for Louisiana’s law. In the *McLean* decision the AEC Flood Geology was found to not be scientific, to be promoting sectarian religious beliefs, and therefore to be illegal for the purposes of teaching in high school science classrooms. The *Edwards* case made similar findings, although it didn’t rule on whether or not creation science was science as well (ibid.). The *Edwards* case was also appealed to the U.S. Supreme Court and was therefore legally binding upon the entire United States (ibid.). Equal time legislation for creation science within high school science classes was no longer a legal option. However, although teaching AEC in high schools was now determined to be illegal in the U.S., the omission of evolution and the introduction of AEC worldviews to high school science classes is still commonplace (Berkman & Plutzer, 2011; Moore & Cotner, 2009; Scott, 2000; Trani, 2004; Traxler, 1993).

The last major development among some AECs was the establishment of the Intelligent Design movement. This movement began in 1984 with the publication of *The Mystery of Life’s Origin* by the authors Charles Thaxton, Walter Bradley, and Roger Olsen. These authors were encouraged to write the book by the original Intelligent Design flagship organization, the Foundation for Thought and Ethics (FTE), located in Dallas, Texas (Scott, 2009). Shortly afterwards this organization would create and publish a high school biology supplementary textbook titled *Of Pandas and People* which was essentially an AEC textbook with the religious language replaced; “creation, creationist, and their cognates” were replaced with “other terms like intelligent design and design proponents” following the 1987 *Edwards v. Aguillard* court decision

outlawing creation science (Scott, 2009: 150). This finding, claims Scott, “demonstrat[es] that intelligent design really was just creationism” (ibid.).

Numbers explains how “when ‘intelligent design theory’ (ID) made its appearance in the late 1980s and early 1990s, critics dismissed it as ‘the same old creationist bullshit dressed up in new clothes’ and disparaged it as merely the latest ‘creationist alias’” (Numbers, 2011: 133). While occasionally antievolutionist in its concepts and arguments, and attracting many AECs into its fold (Scott, 2009), the ID movement is also very distinct from the established forms of AEC. ID advocates make no biblical references and utilize no references to a universal flood, a young Earth, or any specially created creature, including humans (Scott, 2009). Despite this, many evolutionists have made the dubious claim that, because some ID advocates are AECs, therefore the entire movement represents AEC (Scott, 2009). One critic of the ID movement, Barbara Forrest, claims that because the ID leader, William Dembski, interprets the designer in ID to be the Christian God that “is an admission that the true status of ID” as an AEC worldview (Forrest, 2008: 189). Despite these dubious claims as to what the movement is and how it operates, Numbers (2011: 133) has claimed just the opposite, explaining,

The strongest evidence for linking the two antievolution movements was the first book extensively to promote ‘intelligent design,’ *Of Pandas and People: The Central Question of Biological Origins* (1989)...Except for this one book, there is little evidence to link ID and creation science...Scientific creationists, for example, stressed a particular interpretation of Genesis; ID advocates made their case without reference to the Bible.

The leadership of the ID movement was later taken up by several scholars who effectively took over leadership of the ID movement since the early 1990s. The scholar who popularized the ID movement in the public imagination was the University of California law professor, Phillip Johnson, who published the seminal ID book *Darwin on Trial* in 1991. The momentum of this book was built upon with other publications by the biochemist Michael Behe, the mathematician William Dembski, and the philosopher of science Stephen Meyer (Scott, 2009). These scholars would help to establish the flagship ID organization, the Center for the Renewal of Science and Culture within the Discovery Institute think-tank in Dallas, Texas (ibid.). Under this new leadership, ID would remain a nebulous AEC position with proponents taking a wide range of AEC

positions and advocating many different theories and arguments (ibid.). As Scott explains,

Intelligent design is criticized not only for a lack of theory but also for a lack of empirical content. This objection is presented both by scientists and by young-Earth creationists, noting that ID proponents seem reluctant to commit to claims about what happened in the history of life (2009: 132).

Eventually an overzealous elected school board in Dover, Pennsylvania chose to promote ID by buying copies of the ID textbook *Of Pandas and People* and making it available in the high school library, and requiring the high school science teachers in their district to read a disclaimer about evolution and mentioning that ID was a viable alternative to it (Scott, 2009). This policy was challenged in the 2005 *Kitzmiller v. Dover Area School District* case. This court case did a lot to emphasize just how fragmented the ID movement was. For starters, “even before the Dover trial, the most prominent ID-supporting organization, the Discovery Institute, had already pulled back from earlier efforts to try to bring ID into the classroom;” instead by 2002 they argued “that administrators ought not explicitly require ID to be presented as an alternative” (Scott, 2009: 153). Consequently, if the Discovery Institute really did manage or speak for the entire ID movement, the *Kitzmiller v. Dover* trial would never have taken place. This likely explains why the Discovery Institute, along with prominent ID proponents like Meyer and Dembski, did not take part in the trial (Scott, 2009). They simply had no stake in defending policies they did not support, nor a textbook which they had nothing to do with. In the end, the *Kitzmiller* case found that ID was not scientific and could not legally be taught in high school science classrooms (ibid.).

At present the global AEC movement shows no signs of slowing down as AEC organizations continue to demonstrate increasing commitment to engage in massive outreach projects. AECs are also still very active in the legal sphere; “in the United States, politicians in 26 states introduced 110 ‘anti-evolution’ bills between 2000 and 2012 that sought to alter how evolution is taught in public schools” (Johnson et al., 2016). As a recent National Post headline stated, “American creationism isn’t going anywhere. It’s about to unveil a \$172 million life-size Noah’s Ark” (Huskinson, 2016). Massive AEC museums, theme parks, and debates demonstrate both the public’s interest in, and the AECs commitment to, these forms of outreach (Numbers, 2006).

While 61% of Americans believe that evolution should be taught in public high school science classes, 54% believe that AEC should also be taught, and 43% believe ID should be taught as well (Gallup, 2014). With roughly 20% of the population opposing the teaching of each of these three worldviews, and the rest being unsure or having no answer, it is not surprising that so many school teachers are teaching AEC or ID worldviews regardless of legal rulings (Moore & Cotner, 2009; Traxler, 1993). For the foreseeable future, the evolution-creation controversy will remain a major source of contention between AECs, evolutionists, and scientists in general.

Chapter 3: Hidden and Misunderstood Areas

Perhaps the two greatest obstacles for both the public and academic researchers to gaining an accurate understanding of the evolution-creation controversy are the misrepresentations of both AECs and evolution within the literature. Within most academic writing about the evolution-creation controversy, AEC and evolution are both presented in an overly simplified manner, however, in both cases this simplification is utilized toward very different ends. Despite *creationism* being an ambiguous term used to refer to all religiously-based counter-hegemonic worldviews which contradict accepted scientific data and findings (Dixon, 2008; NAS & IM, 2008), the term is often utilized to give the impression that AECs, ID proponents, and occasionally even Theistic Evolutionists are all part of a common group or movement with shared goals, beliefs, and traits (Branch, 2008; Coyne, 2012; Miller, 2007; Root-Bernstein & McEachron, 1982). These supposedly shared commonalities are utilized to label these groups as: anti-scientific, anti-modern, irrational, dogmatic, ignorant, or any other term of derision evolutionists wish to label them with (Armstrong, 2000; Harding, 1991; Moore, 1999). Occasionally this simplification occurs to such an extent that all AECs are treated as a single, coherent, and well-organized movement which collectively alters its tactics in relation to the social circumstances it finds itself in (Scott, 2009; Zimmerman & Loye, 2011).

Evolution, on the other hand, is simplified in order to give the impression that it is both simplistic and easily understood (Ruse, 2005; Scott, 2009). Miller went so far as to state, “I believe that one of the things that bothers people most about evolution is the simplicity of its three-part mechanism. Mutation, variation, and natural selection” (Miller, 2007: 51). Unfortunately, such oversimplifications fail to account for the complexity of evolutionary theory. A committee comprised of representatives from eight different scientific societies summarized evolution in a more complex manner than Miller but were careful to state how “although each of the separate processes involved in evolution seems relatively simple, evolution is not as straightforward as this summary might make it appear. The various processes of evolution interact in complex ways,

and each of them itself has many nuances and complexities” (Futuyma et al., 1998: 7-8). Indeed, it is this complexity which is likely the reason why such a large percentage of the general public, teachers, biology majors, and other professionals do not have a good understanding of evolution (Chinsamy & Plaganyi, 2008; Moore & Cotner, 2009; Nehm & Reilly, 2007; Trani, 2004). Additionally, presenting evolution in an overly simplistic manner fails to take into account the scientific disagreements regarding what concepts and theories evolution does and does not incorporate at present (Laland et al., 2014); the widespread antiquated and contradictory representations which regularly occur when evolution is presented to the public (Getz, 2006; Jean & Lu, 2018); or the seeming inability for science teachers and biology professors to teach evolution to others (Chinsamy & Plaganyi, 2008; Nehm & Reilly, 2007).

What this situation has led to is a very difficult morass of both hidden, misleading, confusing, and belittled narratives within the literature on evolution-creation controversy. AECs are frequently all depicted as working together (Zimmerman & Loye, 2011), despite copious amount of research to the contrary (Numbers, 2006, 2011), and evolution is presented with clear breakdowns which often contradict scientific consensus (Jean & Lu, 2018). Indeed, the presentation of evolution to the public has become so contradictory in the terms, concepts, and relationships utilized that biologists have begun to wonder how people can possibly make sense of what evolution is (Bock, 2007).

In addition, the literature rarely addresses how “evolution, the science, gradually became a source for evolutionism, a substitute for religion replacing Genesis, and also a progressive ideology” (Scott, 2008: 330). Additionally, even when the issue of evolutionism is addressed, it is often dismissed as inconsequential (Futuyma et al., 1998). However, evolutionism has been pervasive throughout the life sciences since the time of Charles Darwin (Kemp, 2012), became a systematized way in which biologists explained evolution to the public (Ruse, 2005), and is still pervasive among biologists today (Miller, 2007). Evolutionism has also been shown to be one of the leading causes for the establishment of the antievolution movement in the U.S. in the 1920s (Davis, 2005; Shapiro, 2008).

Evolutionism is so pervasive at present that the Theistic Evolution organization, BioLogos, founded by the former head of the Human Genome Project and the current Director of the National Institutes of Health in the U.S., Francis S. Collins, takes as one of its primary faith statements to “reject ideologies that claim that evolution is a purposeless process or that evolution replaces God” (BioLogos, 2017). Additionally the American Scientific Affiliation, felt the need to endorse evolution “only ‘as science’ whereas it rejected any extra-scientific implications of or extrapolations from evolution. Indeed, distinctions between evolution and evolutionism (or evolutionary naturalism) had become what characterized the ASA’s position on the evolution issue” (Park, 1997: 330). Even the anti-creationist organization, the National Center for Science Education, had to deal with infighting when their anti-religion members utilized evolutionism and philosophical materialist interpretations of science to attack their fellow members who believed in theism (Park, 1997). Despite this pervasiveness, evolutionism is typically considered a small side-issue in the evolution-creation controversy and this highly problematic phenomenon receives almost no mention within the presently available literature (NAS & IM, 2008; Scott, 2009; Zimmerman & Loya, 2011). This tendency to ignore such an important aspect of how science is frequently presented to non-experts, where religious beliefs are continuously attacked in the name of science (Miller, 2007; Ruse, 2005), is how large collections of scientists depict science as religiously neutral (Klayman et al., 1986; NAS & IM, 2008; Sager, 2008). Consequently, to gain a clear understanding of why the evolution-creation controversy has developed in the manner it has, as well as to understand why AECs have the objections to evolution that they do, we must first isolate and properly identify these problematic areas within the available evolution-creation controversy literature.

3.1 Creationist Folk Devil and Moral Panics

Throughout the academic literature on the evolution-creation controversy there is a particular image of AECs which has been carefully promoted by a wide range of evolutionists and even scientific societies. As discussed earlier, the term *creationism*, as commonly utilized by evolutionists in the evolution-creation controversy literature, is essentially a scientific ethnocentrism which identifies religiously-based worldviews that

in some manner contradict scientific conceptualizations and theories of evolution in addition to the findings of any other area of science (Dixon, 2008; NAS & IM, 2008). However, the term does not simply identify AECs under a single label; it is also used to collectively problematize all the AEC worldviews (Moore, 1999; Scott, 2009). Therefore, it is common for the term to be ‘filled in’ with supposedly universally applicable descriptions, dogmas, goals, traits, a singular history, and universal alternating forms of outreach (NAS, 1984; Scott, 2009; Zimmerman & Loye, 2011). One anti-creationist expert, the Deputy Director of the National Center for Science Education, Glenn Branch, has even claimed that there is a singular “creationist ideology” (2008: vi). The effect of this filling in of the concept is to create a singular straw-man out of all the myriad of differing and often incompatible AEC worldviews, groups, and organizations.

This straw-man of creationism is utilized to great effect when problematizing AEC to the public, scientists, and the media as it presents all AECs as colluding together in a grand conspiracy while providing very inaccurate misrepresentations of most AEC worldviews to the public for the purpose of undermining any claims they might have to scientific trust or credibility (Numbers, 2011; Shapin, 1988; Zimmerman & Loye, 2011). However, this straw-man of creationism is not simply used to attack an inaccurate and mythologized caricature of AECs (Numbers, 2011) or to undermine their scientific standing (Gieryn, 1983; Shapin, 1988), it is also utilized in order to mobilize public opinion against AECs whenever scientists feel their disciplinary fields are under attack (Scott, 1997). Consequently, a more encompassing concept is required in order to take into account both the misrepresentation of AECs and to present AEC in such a way that a panic is created during the times when evolutionists wish to attack AEC worldviews and outreach activities.

Stanley Cohen initially proposed his theory of *folk devils* and *moral panics* to explain how the media, experts, and public intellectuals can be mobilized to manipulate public opinion by creating inaccurate caricatures of social groups which are disliked by those in power, by presenting them as a threat to the public for the purposes of creating a moral panic. His book *Folk Devils and Moral Panics: The Creation of the Mods and Rockers* defines folk devils as “visible reminders of what we should not be” (Cohen, 2002: 1). In other words, folk devils are essentially straw-men of counter-hegemonic

positions. They are also the focus of moral panics, which occur when “a condition, episode, person or group of persons emerges to become defined as a threat to societal values and interests” (ibid.). Moral panics are essentially social reactions to the portrayal of folk devils to the public by the media and others who occupy a society’s “moral barricades” (ibid.). Those who are perceived as occupying the moral barricades are those who occupy positions of hegemony within a society. Cohen provides the examples of “editors, bishops, politicians and other right-thinking people” as well as “accredited experts” (2002: 10) in a wide variety of areas including science (Futuyma et al., 1998), and scientific popularizers as well (Gieryn, 1999).

In the case of AECs, the labels *creationism* and *creationist* have become folk devils and any time that AECs attempt to significantly alter educational policy or laws to allow significant alterations in how evolution is taught, or to allow AEC worldviews into U.S. high schools, a moral panic is created by scientists and scientific popularizers who occupy the moral barricades (Scott, 2009). AEC challenges to evolutionary teaching have been occurring for over a century now in the U.S., yet moral panics have been limited to only a few court cases which are emphasized in the standard historical narrative of the evolution-creation controversy (Numbers, 2006; Scott, 2009). This fits Cohen’s model of moral panics as “the notion of a ‘permanent moral panic’ is less an exaggeration than an oxymoron. A panic, by definition, is self-limiting, temporary and spasmodic, a splutter of rage which burns itself out” (Cohen, 2002: xxx). Consequently, while the entire history of the evolution-creation controversy is not a moral panic, moral panics are a useful tactic which evolutionists have utilized to generate support during critical court cases (Scott, 2009). They have become so synonymous with AECs that some experts even argue that a lack of moral panics means that AECs have been unsuccessful in some countries (Barker, 2004). For most of the evolution-creation controversy in the U.S. scientists and the general public tended to ignore AEC activities and outreach when moral panics are not occurring (Park, 1997; Scott, 1997). As Barker claimed, “Canadian creationists can only dream of receiving the kind of attention their American colleagues get from the popular media” (2004: 95). Incidentally, AECs have always engaged in more successful outreach when moral panics have not occurred (Numbers, 2006; Scott, 2009).

The creation of moral panics is an effective tactic utilized by evolutionists to combat AEC worldviews and outreach during periods when the integrity of science is perceived to be under threat. Not only is it useful for involving typical professions which occupy the moral barricades, such as religious leaders and the media (Numbers, 2006; Scott, 2009), but it is also necessary to mobilize the scientific community to engage in its own defense as well. It has been argued by several experts that far fewer scientists would get involved in the defense of science if there was not a moral panic occurring (Scott, 1997; Shermer, 1991). Cohen notes how “at times of moral panic, societies are more open than usual to appeals to this consensus: 'No decent person can stand for this sort of thing.' The deviant is seen as having stepped across a boundary which at other times is none too clear” (Cohen, 2002: 57-58). Scott notes the differences regarding the reactions of the scientific community to general threats vs the short-lived moral panics surrounding particular court cases in the U.S. stating,

It is doubtful whether scientists would have been involved in such analyses if the creation and evolution issue had not become politicized. There had been no scholarly response to Whitcomb & Morris's *The Genesis Flood* when it appeared in 1963, but a decade later when such ideas were used to justify legislation that would radically change science education in the United States, the science community did not remain silent. The response was not only individual, but institutional (Scott, 1997: 276).

Michael Shermer also elaborates about how the scientific consensus achieved in the *amicus brief* submitted for the 1987 *Edwards v. Aguillard* court case would have likely been impossible to achieve under circumstances not involving a moral panic. He explains how “in spite of centuries of attention by scientists and philosophers of science, no concise definition of science had been accepted by the community of scientists and scholars” (1991: 525). Yet “on August 18, 1986...seventy-two Nobel laureates, seventeen state academies of science, and seven other scientific organizations submitted an *amicus curiae* brief to the Supreme Court in which they defined and agreed upon the nature and scope of science” (ibid.). He explains how “if the brief submitted in the Louisiana creationism case had been represented to such an illustrious group of scientists for the purpose of philosophical agreement (rather than political dominion), it is extremely doubtful that agreement would ever have been reached” (Shermer, 1991: 535). The moral panic surrounding the *Edwards* case therefore had

the effect of galvanizing the scientific community into forming a consensus regarding what science is and how it operates, demonstrating Cohen's observation that moral panics lead to consensus and a clarification of boundaries. However, as others have noted, scientists do not respect or adhere to the consensus reached during times of moral panics (Gieryn, 1999; Jean & Lu, 2018).

Additionally, the scientific community is incredibly difficult to mobilize in order to defend the integrity of, and the teaching of, science. The scientific community remains largely silent on AEC outreach and activities outside of moral panics (Park, 1997; Scott, 2009). Frequently scientific organizations will release statements and publish articles, but direct public engagement is anathema to them. "When Wayne Moyer [director of the National Association of Biology Teachers], in early 1980, called for the participation of scientific organizations to form a national network of biologists who would willingly stand up in public against creationism, not a single organization responded to it" (Park, 1997: 338). Large scale counter-AEC activities which existed in the 1980s were predominantly led by volunteers and laymen as the prominent scientific organizations refused to take on any leadership role (Park, 1997). As one historian explained, "the failure of the main scientific organizations to directly counter creationism, coupled with their general apathy towards the issue, reduced the impact of anti-creationism on the creationist movement, and ultimately contributed to the continuous thriving of creationism" (Park, 1997: 339).

Even prominent scientific organizations themselves noticed their own apathy towards the evolution-creation controversy. On October 19th, 1981 the President of the National Academy of Sciences called an emergency meeting of scientists and educators. At this meeting it was determined that there exists a "lack of interest in the issue by scientists" (Park, 1997: 242). Prominent scientific organizations in the U.S. are even occasionally willing to avoid the issue of evolution altogether to avoid controversy. During a national scientific meeting in 1989, the National Science Foundation director stated,

Any research proposal abstract or title they [the NSF] receive that has the 'e-word' in it is rewritten before it gets out of the office. All titles and abstracts are sent to Congress, and Senatorial and House aides skim them over, looking for

'controversial' topics. Eliminate evolution, and at least one source of controversy is eliminated (Park, 1997: 338).

This framework of moral panics also interprets well the evolutionists who are directly involved in counter-AEC campaigns and organizations. The moral panics surrounding the *McLean* and *Edwards* court cases led to the development of an international network of counter-AEC organizations referred to as the "Committees of Correspondence on Evolution" (Park, 1997: 273). These were comprised of scientists, educators, lawyers, and other volunteers willing to share information and support one another in public campaigns and other forms of outreach to counter AEC worldviews, arguments, and outreach. The first of these committees were founded in 1980, and by 1986 "the network was substantially complete, with Committees in all fifty states as well as five Canadian provinces" (Park, 1997: 283). However, this network began to dissolve almost as quickly as it was created. By 1983, after only a few years of activity, the Committees had already begun to scale back their organizations. By 1987, following the *Edwards* decision, the Committees "were already no more than a 'paper network'" (Park, 1997: 296) and only a few organizations would reply when contacted by others (Park, 1997). No other situation in the history of the evolution-creation controversy highlights the necessity of moral panics to motivate evolutionists and scientists to counter AEC outreach and activities.

There have been four moral panics which have occurred throughout the history of the evolution-creation controversy, beginning with the *Scopes* trial in 1925, the *McLean* case in 1982, the *Edwards* case in 1987, and the *Kitzmiller* case in 2005 (Numbers, 2006; Scott, 2009). While there have been many more significant court cases in the U.S. which have drastically altered the legal landscape regarding how evolution and AEC worldviews can be taught in high schools, such as the *Epperson* case in 1968, none of the others possess the characteristics of a moral panic (Numbers, 2006; Scott, 2009; Zimmerman & Loye, 2011). In between these moral panics, the scientific community, as well as the media, tends to ignore AEC activity and outreach (Park, 1997). For example, from the 1930s until the 1970s, AEC organizations, outreach, and teachings were largely ignored by the scientific community (Numbers, 2006), and despite evidence that AEC worldviews are illegally taught in U.S. high school

science classrooms at present, the scientific community largely continues to ignore it now as well (Berkman & Plutzer, 2011; Moore & Cotner, 2009; Traxler, 1993). Moral panics are therefore a vital function to mobilize, not just the scientific community, but evolutionist public scientists as well to come to the defense of science, but they apparently cannot be sustained over the long term (Cohen, 2002).

Moral panics have several defining features which serve to differentiate it from measured and informed reactions to well-understood threats to hegemonic positions (Cohen, 2002). Referring to an occurrence as a moral panic “does not imply that this something does not exist or happened at all and that reactions are based on fantasy, hysteria, delusion and illusion or being duped by the powerful” (Cohen, 2002: viii). What it does mean is that the extent and significance of the folk devil has been exaggerated either in itself or compared with more serious issues (ibid.). AECs, along with their organizations and outreach activities, certainly do exist and are a potential threat to the present scientific hegemony (Numbers, 2006). What has been exaggerated is the significance of AEC worldviews, as many do not reject all or even most of evolution (Numbers, 2011; Scott, 2009); AEC dogmatism, as their worldviews are often not dogmatically held by people who self-identify as creationists (Hill, 2014); and the extent to which AECs cooperate together, which is minimal (Numbers, 2006).

3.2 The Victor’s Historical Narrative

While collectively AEC organizations are growing and spreading internationally, it is also a very broad movement comprised of widely diverse groups and organizations promoting a myriad of different worldviews, arguments, and agendas (Numbers, 2006). As one researcher noted, “in the USA, even within Protestant fundamentalism, creationism is fractured into a number of distinct organizations that appear to be following distinct agendas, notwithstanding whatever broad beliefs they may be said to share” (Locke, 2004: 45-46). Numbers explains how this is a longstanding problem among AECs, where even the more prominent leaders cannot reach a consensus regarding what types of outreach they should do, what worldviews they should promote, or which arguments they should utilize (Numbers, 1982). While occasionally promoting similar materials and arguments, these AEC groups and organizations often have little to do with one another (Numbers, 2011). It can even be difficult to avoid infighting

within singular AEC organizations when they get large, national, or international in size as several have completely dissolved or split over doctrinal and/or structural disputes (Numbers, 2006). Consequently, challenges to the teaching of evolution or the introduction of AEC worldviews into the U.S. high school science classrooms is often the work of a minority of AECs who do not represent the worldviews, outreach, or goals of all AECs (Numbers, 2006). In some cases, the AECs who attempt to inject their worldview into high school science classes are doing so in opposition to the wishes of many AECs who share a similar worldview; such was the case with Intelligent Design in the 2005 *Kitzmiller* court case (Meyer, 2017).

Nevertheless, many evolutionists have attempted to present AECs as a single and coherent folk devil which operates as a collective (Zimmerman & Loye, 2011). Numbers explains how “even relatively informed persons tend to overlook the substantial changes in creationist thought during the twentieth century and the intense controversies precipitated by those changes. The common assumption seems to be that one creationist is pretty much like another...nothing could be further from the truth” (Numbers, 2006: 9). Nevertheless, the folk devil of AEC allows evolutionists to leave the impression that AECs, as a whole, are being continuously defeated. By depicting AECs as collectively suffering one defeat after another, evolutionists are able to present the public and scientists with a ‘victor’s historical narrative’ wherein supposedly all AECs attempt to inject AEC worldviews, or to prevent the teaching of evolution, in high school science classes. Most importantly, all these attempts are identified as having ended in complete failure (Scott, 2009; Zimmerman & Loye, 2011). Even when AECs have successfully had their policies enacted in both public and private schools, such as in Canada, they are often labelled as unsuccessful for arbitrary reasons, such as not being the subject of a moral panic (Barker, 2004).

In order to substantiate a victor’s historical narrative, as well as assist in the creation of moral panics, AECs must be represented as a coherent collective, a folk devil, which acts in a unified and predictable manner, and which is collectively defeated throughout history. Cohen explains how “moral panics depend on the generation of diffuse normative concerns, while the successful creation of folk devils rests on their stereotypical portrayal as atypical actors against a background that is overtly typical”

(2002: 45). As previously discussed, the folk devil of AEC is atypical due to its derogatory qualities such as being “militant, strident, dogmatic, ignorant, duped, backward, rural, southern, uneducated, antiscientific, anti-intellectual, irrational, absolutist, authoritarian, reactionary, bigoted, racist, sexist, anticommunist, war mongers” (Harding, 1991: 373), to name just a few. They are described as reacting defensively to “threatening social changes brought about by immigration and the Industrial Revolution;” their ideas deriving from mainly “‘back-woods’ areas, from rural people irritated by the liberal attitudes of the industrial North;” and of using a “literal interpretation of the Bible” as a “bulwark against modern ideas” (Nelkin, 1982: 47).

The victor’s historical narrative, on the other hand, is what enables evolutionists to depict AECs with a background which is overtypical. The interpretative groundwork for the evolutionist victor’s historical narrative is based upon the 1925 *Scopes* trial (Harding, 1991). However, this depiction of *Scopes* is almost entirely fictionalized. The popular interpretation of the trial is now so at odds with the actual history that Larson (2006: 245) refers to it as “the mythical *Scopes* legend.” Bryan and other AECs involved in the trial were unable to accept the evolutionism presented as a component of evolution instruction due to their progressive ideals and their pride in their cultural and religious ideals (Davis, 2005; Shapiro, 2008). These aspects of history are neglected in favor of a fictionalized account of the *Scopes* trial promoted in the popular 1955 Broadway play *Inherit the Wind* and the movies based on it (Davis, 2005; Scott, 2009). “The popular image of Bryan, derived largely from the play and film *Inherit the Wind*, is of a pompous boor with a general disregard for new ideas. The real Bryan was a populist reformer, not a reactionary” (Davis, 2005: 254). Scott explains how this fictionalized account differed radically from the historical events and people involved with the actual *Scopes* trial, but nevertheless “this play and the movies based on it have strongly shaped public images of the *Scopes* trial and contributed to the negative public image of fundamentalists” (Scott, 2009: 102).

Recently historians have begun to recognize the events leading up to and including the *Scopes* trial had little to do with dogmatic conflicts with evolution (Davis, 2005; Shapiro, 2008). As the historian Adam R. Shapiro explains, “by the time of the *Scopes* trial, Darwinian evolution had been well known and accepted by virtually all

American scientists for over half a century. There was no sudden realization in the 1920's that Darwin did not accord with the Bible. No new science-religion conflict led to antievolution legislation" (Shapiro, 2008: 413). Bryan and other antievolutionists' reaction to evolution was due to the rampant evolutionism present in the teaching and utilization of evolution at that time. In his research Bryan had discovered links between evolution and the validation of eugenics, Social Darwinism, militarism, racism (Davis, 2005; Moran, 2003), and "a laissez faire approach to social policy [which] stood in stark contrast to Bryan's long career of advocating progressive social reform" (Davis, 2005: 255). Further supporting the claim that dogma was not the main cause of Bryan's antievolutionist movement is that Bryan was not a "strict creationist" (Numbers, 1982: 540). Shortly before the *Scopes* trial he had admitted he "had no objection to 'evolution before man but for the fact that a concession as to the truth of evolution up to man furnishes our opponents with an argument which they are quick to use, namely, if evolution accounts for all the species up to man, does it not raise a presumption in behalf of evolution to include man?'" (ibid.). It was this claim, that humans evolved, which allowed for the evolutionism-based positions to which Bryan was opposed. In addition, when visiting college campuses all over the U.S., as well as reading the latest research from the psychologist James H. Leuba "who demonstrated statistically that college attendance endangered traditional religious beliefs" (Numbers, 1982: 538); Bryan noted that evolutionism was also destroying religious belief, which he believed was the very foundation of morality in society (Davis, 2005).

In addition to the AEC objections to rampant evolutionism present at this time, another factor encouraging those in the AEC movement was the addition of evolutionism to the high school textbooks. The most widely utilized evolution textbook in the U.S., and the one which John Scopes claimed to teach from at trial, was George W. Hunter's 1914 *A Civic Biology* which, among other things, declared the existence of a hierarchy of human races with Caucasians at the top, promoted eugenics, and the killing or segregation of people with "socially problematic and costly traits as alcoholism, promiscuity, criminality and feeble-mindedness" (Shapiro, 2008: 411). Shapiro attributes the success of the new AEC movement in Tennessee to the biology textbooks of this period. The sudden spread of high school education to the rural south exposed more of

the population to evolutionism, a point which other historians have noted as well (Larson, 1987). These biological textbooks also presented a rural lifestyle and culture in an insulting manner, “were explicitly focused on goals of preparing students for life as urban citizens in an industrial environment” (Shapiro, 2008: 414). Shapiro (2008: 413-414) summarizes how dogmatic disputes were confused with the actual situation, stating,

The rhetoric of science-religion conflict was used to justify passing the antievolution law; after the Scopes trial it would be seen as the primary reason for the statute. But the success of the antievolution movement in Tennessee had more to do with objections to compulsory education and the ideology it incorporated. The new field of biology embodied this ideology, because its textbooks were explicitly focused on goals of preparing students for life as urban citizens in an industrial environment.

All of the non-dogmatic reasons for objecting to the teaching of evolution to the nation’s youth including the highly biased media coverage (Harding, 1991), coupled with the mythologized account in *Inherit the Wind*, provided an incredibly inaccurate and misleading basis upon which to begin a victor’s historical narrative. “After the Scopes trial, antievolutionism become associated in the popular imagination with conservative religious views – and with the most negative stereotypes of such views.

Antievolutionists and fundamentalists in general were portrayed as foolish, unthinking, religious zealots” (Scott, 2009: 102). Subsequent moral panics which followed drew upon this mythologized account of *Scopes* in order to typify all subsequent AEC challenges to scientific hegemony. The *McLean* and *Edwards* court cases in the 1980s and the 2005 *Kitzmiller* case were all linked to *Scopes* by scientists and the media. The 1980s cases were frequently referred to as “Monkey Trial Revisited,” or “Scopes II” (Gieryn et al., 1985: 392), and *Kitzmiller* was referred to as the “modern-day Scopes Monkey Trial” (Harvey & Rothschild, 2010: 8). The fiction of *Scopes* is now much more pervasive than the actual events as “most consider the Scopes trial a victory for evolution” (Scott, 2009: 104) despite the obvious fact that Scopes lost (Scott, 2009). Consequently, it is this fiction, continuously presented at all the major trials which serves as the bedrock of the victor’s historical narrative. The evolutionists are righteous defenders of objective science, the AECs are ignorant, dogmatic, and closed-minded, and, perhaps most importantly, the AECs always lose.

3.3 “Waves” and “Periods”

Beyond simply using labels to link moral panics to popular misunderstandings of *Scopes*, the victor’s historical narrative also involves utilizing the four moral panics, along with the 1968 *Epperson* case, which was not a moral panic, to identify definite and universal trends among all AECs (Numbers, 2006; Scott, 2009; Zimmerman & Loye, 2011). These court cases occurring in 1925, 1968, 1982, 1987, and 2005, are not simply events where AECs were supposedly defeated in court; they are also argued to represent important transitions in AEC outreach and tactics. The time periods surrounding these court cases have been interpreted as representing five distinct waves (Zimmerman & Loye, 2011) or periods (Scott, 2009) in AEC activity. These time periods are: 1859-1925, 1925-1968, 1968-1987, 1987-2005, and 2005-Present.

The first such period occurred between the publication of Darwin’s *Origin* in 1859 and the *Scopes* trial in 1925. The wide-ranging religious and scientific responses to Darwin’s ideas (Turner, 1978), coupled with how “there was...little active opposition to evolutionary theory” (Zimmerman & Loye, 2011: 3) during this time make this a relatively uninteresting period of AEC activity. However, designating it as a definite period lays the groundwork for the claim that AECs began to collectively alter their tactics in relation to judicial decision-making, which is a narrative device utilized throughout the victor’s historical narrative. Therefore, the passage of the Butler Act in Tennessee and the defense of it at *Scopes* meant that a new period started immediately afterwards, where supposedly all AECs would adopt similar tactics and “opposition to evolution was broad-based and mostly at the state level” (Zimmerman & Loye, 2011: 3).

Following *Scopes* came the second period from 1925 until the 1968 *Epperson* trial. Due to the widespread belief that the scientific community had won a huge victory at the *Scopes* trial (Scott, 2009; Shermer, 1991), both the media and the scientific community generally ignored the organizational outreach and development of AECs until the 1970s (Numbers, 2006; Scott, 1997). According to Scott, within this period AECs were mostly inactive due to how “antievolutionism became largely unnecessary: evolution remained effectively absent from science instruction until the 1960s” (Scott, 2009: 103). While apparently being inactive, AECs also “worked to pass legislation that would eliminate evolution from the classroom and textbooks” (Scott, 2009: 95). This

period was disrupted in 1963 when evolution was reintroduced into high school science textbooks, and definitively ended in 1968 when the *Epperson* decision made all antievolution laws in the U.S. unconstitutional (Scott, 2009).

Defining this second period of AEC activity is problematic both in terms of the activities discussed and the dates provided. As explained in the last chapter, this was not a period of inactivity for AECs despite how it is often claimed to be so (Numbers, 2006; Scott, 2009). AECs were creating the first AEC organizations, engaging in copious amounts of outreach activities, and, for the most part, working with local school boards, textbook publishers, local communities, and school teachers to remove evolution from the high school science curriculum; a strategy which was incredibly effective and is still utilized at present (Scott, 1997, 2009; Traxler, 1993). Presenting this time period in this manner has negative implications for the scientific community as it raises the obvious question: why did the scientific community not act to preserve the teaching of evolution in schools and counter the outreach activities of AECs during this time period? Given the history of the evolution-creation controversy, the answer would seem to be that a moral panic is required to galvanize the scientific community into taking action; as no moral panic occurred, and the media did not cover the removal of evolution from schools, there was no general awareness of this occurring (Numbers, 2006). However, the victor's historical narrative is not a tale of apathy or ignorance but of victory for the scientific community. Consequently, this period is claimed to be a period of AEC inactivity, rather than a period of AEC successes. This instead presents a story where, despite the scientific communities' crushing victory over AECs at *Scopes*, both sides remained inactive for roughly forty years. This is much more fitting with the victor's historical narrative than recognizing how subsequent AEC activities and outreach were mostly ignored (Numbers, 2006; Scott, 1997).

As to Scott's other claim, that this period came to an end due to the 1968 *Epperson* decision; while evolution did largely disappear from high school science classrooms and textbooks, there were very few cases where antievolution legislation was passed (Scott, 2009). Although thirty-seven antievolution bills were introduced to twenty state legislatures between 1921 and 1929 (Zimmerman & Loye, 2011), only three were passed: in Tennessee, Mississippi, and Arkansas (Scott, 2009).

Consequently, this tactic was almost completely abandoned by the end of the 1920s and no major AEC legislation was passed at the state level until the 1980s (ibid.). Therefore, the consequences of the 1968 *Epperson* decision have been greatly exaggerated. Even Scott admitted how “Epperson had more of a psychological effect on antievolutionism than an actual one, as the Arkansas and other antievolution laws had hardly ever been enforced” (Scott, 2009: 111). In fact, the states which had passed antievolution laws embraced the reintroduction of evolution into the scientific curriculum in the early 1960s, completely ignoring these laws (Park, 1997). This second period of the victor’s historical narrative reveals more about how evolutionists wish to view themselves, as steadfast defenders of scientific education, rather than revealing actual trends in AEC activity.

The time between *Epperson* in 1968 and *Edwards* in 1987 is identified as the third period of AEC activity (Zimmerman & Loye, 2011). The victor’s historical narrative makes two main claims regarding the effect of the 1968 *Epperson* decision on AEC outreach and activities. The first is that AECs were all forced to suddenly alter their tactics and abandon attempts to pass antievolutionist legislation. Instead they would now focus on promoting new ‘equal-time’ legislation (Numbers, 2006). The second claim is that in order to justify teaching AEC worldviews alongside evolution in high school science classes, “creationists regrouped and attempted to define creationism as science” (Zimmerman & Loye, 2011: 3). Again, as with the first period, these claims are very problematic.

A closer look reveals that the dates utilized to attribute significance to the *Epperson* decision do not coincide with the alterations in AEC outreach and activities. As described above, the AECs had largely abandoned the goal of passing antievolutionist legislation in the late 1920s (Scott, 2009). Even when these laws were on the books, they were consistently ignored by the early 1960s (Park, 1997). In addition, equal-time legislation predates the *Epperson* decision, as several AECs had sought to pass equal-time legislation in 1963 (ibid.). Also, the *Epperson* decision did not cause AECs to suddenly attempt to label their worldviews as scientifically valid. Many, if not most, AECs and AEC organizations had claimed their worldviews were scientifically valid since the early 20th century (Numbers, 2006). Even the term *scientific*

creationism arose long before the *Epperson* decision. Members of the American Scientific Affiliation had advocated “adopting the euphemism ‘scientific creationism’ to cover views ranging from progressive creationism to theistic evolutionism” (Numbers, 2006: 201) since the 1950s, however the label did not catch on until after the publication of Morris’ book *Scientific Creationism*, which was published in 1974, six years after *Epperson* (Scott, 2009). This historical evidence suggests that the *Epperson* decision, while much more legally decisive than *Scopes* (ibid.), is just as mythologized and misunderstood in terms of its effect upon AEC activities and outreach.

Twelve years after *Epperson* there was indeed a push made by many AECs to pass equal-time legislation in a multitude of different state legislatures in the U.S. (Scott, 2009). Equal-time legislation was introduced in at least twenty-seven states but all died in committee with the exception of Arkansas and Louisiana, which were the only two states to pass such laws (ibid.). Consequently, similarly to the 1920s antievolution legislation, equal-time legislation proved to be an ineffective outreach tactic and appeared to be abandoned after 1981 (ibid.). The Arkansas law was successfully challenged in *McLean* and the Louisiana law was found to be unconstitutional in *Edwards* (Zimmerman & Loye, 2011). As the *McLean* decision determined that creation science was not science, and the *Edwards* decision made equal-time legislation illegal across the U.S., these two court cases have been presented as ending the third period of AEC outreach (Scott, 2009; Zimmerman & Loye, 2011).

This third period is the most historically accurate of all the periods presented in the victor’s historical narrative. However, it describes a general development in AEC outreach and thought rather than a reaction to judicial decision-making at the time. Most of the terms, ideas, and legislation identified with this period date back at least to the late 1950s and early ‘60s, and while the *McLean* and *Edwards* decisions legally prevented AECs from introducing their worldviews into high school science classes, the inability of AECs to convince most state legislatures to adopt their equal-time legislation demonstrated it was an ineffective method of outreach anyways. Also, given just how many state legislatures had equal-time legislation bills introduced, it obviously involved a large number of AECs and AEC organizations (Numbers, 2006).

The fourth period of the victor's historical narrative begins in 1987, following *Edwards*, and goes until the 2005 *Kitzmiller* trial (Zimmerman & Loe, 2011). Several researchers have claimed that, "The next move by creationists was, quite literally, to dress up the 'creation science' that the courts had ruled to be inappropriate for consumption by public school children to make it look like something it was not. The transformation yielded what has become known as 'intelligent design'" (Zimmerman & Loe, 2011: 4). Scott describes how "in effect, proponents shifted their strategy from proposing to balance evolution with creation science to proposing to balance evolution with creation science in other guises" (Scott, 2009: 119). In other words, according to the victor's historical narrative, after *Edwards* most or all AECs dropped "creation science terminology" (ibid.), and all mention of biblical scripture in order to promote their AEC worldviews in new scientific guises such as "abrupt appearance theory" (Scott, 2009: 121) and "intelligent design" (Scott, 2009: 122). This supposedly occurred until attempts were made to enact educational policy which would promote Intelligent Design to high school students, which immediately led to a legal challenge and the *Kitzmiller* trial (Scott, 2009). In this court case it was decided that Intelligent Design was not science and could not legally be taught in high school science classrooms. As some researchers put it,

The decision Judge Jones crafted was both so tight and so comprehensive that it makes it incredibly unlikely that any other piece of legislation promoting 'intelligent design' will be able to pass muster. This is likely to be the case even though Jones's ruling from the federal bench officially binds only the Middle District of Pennsylvania. It is thus fair to say that the Dover decision brought an end to creationism's fourth wave" (Zimmerman & Loe, 2011: 5).

There are several problems with this description of how the fourth period of AEC activity occurred. The main problem is that most of the major AEC organizations have denounced Intelligent Design worldviews and arguments (Numbers, 2006, 2011) and ID proponents generally have little engagement with these other, much larger, better funded, and more organized Young Earth Creationist organizations (Numbers, 2006, 2011; Scott, 2009). The *Edwards* decision also did little to stop the growth and reach of the major Young Earth Creationist organizations, and the two largest and most influential organizations within both Canada and the United States, Answers in Genesis and Creation Ministries International, were both founded, in part from other

organizations, several years after the *Edwards* decision (Numbers, 2006). It is therefore obvious that the *Edwards* decision had little effect on the adoption of and advocacy for Young Earth Creationist worldviews and 'Creation Science' more generally.

Additionally, describing the rapid spread of the ID movement in the 1990s, Numbers explains how the ID leader, Phillip E. Johnson "and his disciples took a beating from all sides: scientific creationists, theistic evolutionists, and, of course, naturalistic evolutionists. Although some young-earth creationists applauded the effort to discover evidence of God in nature, the leaders of creation science never warmed up to ID theory" (2006: 377). This claimed transition from majority Young Earth Creationist worldviews to Intelligent Design worldviews is based on: the ID advocacy by some Young Earth Creationists (Scott, 2009), the use of ID materials by some Young Earth Creationist organizations and groups (Numbers, 2006), and the evidence of a single textbook which the flagship ID organization, the Discovery Institute, had nothing to do with (Meyer, 2017; Numbers, 2011). In addition, the ID movement began in 1984 (Scott, 2009), three years before the *Edwards* decision which supposedly caused it.

Finally, the fifth and last period of AEC outreach is claimed to have begun with the defeat of Intelligent Design in the 2005 *Kitzmiller* decision and is still occurring today (Zimmerman & Loye, 2011). Many evolutionists take the view that "the latest creationist movement moves beyond a specific mandate to teach 'another side' of evolution such as 'creation science' or 'intelligent design.' Rather, this new movement is entirely focused on what proponents claim is their desire for students to learn the 'strengths and weaknesses' of evolution" (Zimmerman & Loye, 2011: 5). Scott highlights the importance of this new period claiming that "after ID failed to survive its first court challenge, [Evidence Against Evolution] EAE has become the most popular manifestations of creationism" (Scott, 2009: 153). In other words, these evolutionists believe that Young Earth Creationist organizations are no longer promoting a distinctly Young Earth Creationist worldview as scientific due to the *Edwards* decision, that Intelligent Design is now defunct due to the *Kitzmiller* decision, and that all the remaining AEC organizations are, for the most part, engaging in Evidence Against Evolution tactics instead (Bleckmann, 2006).

This amazingly inaccurate and misleading victor's historical narrative has obviously led to many of the misconceptions of what AECs believe, how their arguments work, and how far their organizations have managed to spread. Given the successes, especially of Young Earth Creationist organizations in spreading globally and opening multi-million dollar museums and theme parks (Numbers, 2006; Scott, 2009), this line of reasoning is simply counter to the evidence. Also, this victor's historical narrative also serves to distort evolutionists' present assessments of AEC, which is likely the reason why so many scientists and scientific popularizers claim AEC is confined to the United States when that obviously is not the case (Numbers, 2006).

If discussions concerning AEC outreach were strictly limited to those relating to official educational policy and legislation in high school science classes, then these periods or waves described by Scott and others would come close to resembling the legal reality of the U.S. at present. Their victor's historical narrative is almost entirely legal-centric and assumes both that legal decisions shape AEC positions, and that the AECs which appear in court are representative of all AECs in existence. Unfortunately, both of these assumptions are very misleading and do not accurately represent the diversity of AEC worldviews, organizations, outreach, goals, or developments over time (Numbers, 2006).

The victor's historical narrative utilized by evolutionists is utilized to accomplish two distinct goals. The first is to overgeneralize the AEC outreach involving educational legislation and policy as being the sum total of all AEC outreach during particular periods of time. This narrative tactic is required to create a victor's history where evolutionists are continuously defeating AECs as it is the one and only arena where victories do regularly occur. However, these court victories are misleading, both for the reasons described above, and for how evolution is actually being taught in high school science classes in the U.S. and Canada (Barker, 2004). This point is clearly made in a recent article published in *Science* titled "Defeating Creationism in the Courtroom, But Not in the Classroom" (Berkman & Plutzer, 2011). The second goal is to assist with the creation of the folk devil of AEC. By describing all AECs as acting collectively by engaging in the same outreach activities, supporting the same worldviews, and altering their arguments at the same time, evolutionists have created a folk devil which is

continuously defeated, and whose outreach strategies are continuously altered due to judicial decision-making.

Such interpretations are not only erroneous, but they also prevent scientists and the public from understanding how AECs have changed over time, what worldviews and arguments they actually hold to, and thereby prevent any chance for informed dialogue and discussion to occur across the gulf between evolutionists and AECs (Numbers, 2011). It even hinders anti-AEC activities as the victory claimed by evolutionists at the *McLean* trial and its supposed significance, signifying the defeat of all AEC outreach at the time, has been identified as a probable cause for the quick dissolution of the Committees of Correspondence on Evolution following the court decision (Park, 1997). Consequently, the only nation-wide and international in scope anti-AEC network may have been abandoned after only a few years because the *McLean* decision was celebrated as an end to that particular moral panic.

3.4 ‘Filling in’ the Folk Devil

In order to depict AECs as a single collective entity, a folk devil has been created and continuously drawn upon to both problematize AEC worldviews and outreach as well as to periodically create moral panics. This is accomplished in two ways; the first method is by simply by referring to all AECs with the single label of *creationism* (Moore, 1999; Scott, 2009). This method can involve many different techniques. Some evolutionists do not take the time to define what specifically is meant by the term (Moore, 1999), leaving it to the reader to assume what all AECs have in common. Others define the term vaguely, such as the National Academy of Sciences & the Institute of Medicine (2008) which defined a creationist more by what they reject than what they actually believe.

The second method is to fill in the term by attributing shared beliefs, outreach, arguments, and trends to all AECs. Some evolutionists attempt to define all AECs with particular doctrinal beliefs (NAS, 1984; Scott, 2009). For example, Ruse defined all AECs as Young Earth Creationists by defining creationism as “the specific, biblically based religion of many (especially American) evangelicals – six days of creation, miracles needed to make species, humans given form last, universal flood, and so forth”

(2005: 4-5). Others engage in this misrepresentation as well, such as when the National Academy of Sciences explained how “the creationists’ conclusion that the earth is only a few thousand years old was originally reached from the timing of events in the Old Testament, including the counting of recorded generations” (NAS, 1984: 13-14). These definitions and descriptions of AECs serve not only as misinformation to confuse both academics and the public regarding who AECs are and what they believe; it also creates an unambiguous folk devil to attack and condemn.

This second method of filling in the folk devil is strongly tied to the evolutionist’s victor’s historical narrative. These two methods are used in combination by evolutionists to attribute shared characteristics to all AECs. This is necessary as the term *creationism* is a negative term, signifying what people reject rather than what they actually believe and advocate for. As one researcher put it, “the label creationist, while often useful for categorizing the great variety of people who reject evolution, is much too broad to give educators an appropriate understanding of the myriad rationales as to why their students reject evolution” (Alters, 1999: 103). Despite this there have been many evolutionists who have sought to attribute characteristics to all AECs by making overgeneralized claims such as discussing “creationist strategies” (Branch, 2008: v) or how “creationists claim that it is unfair not to teach creationism along with evolution, or not teach that evolution is in a precarious state” (ibid.: vi). Such claims have become normalized in the evolution-creation controversy (Numbers, 2006).

The worst perpetrators for making unsubstantiated or incorrect claims for all AECs seem to be the scientific community itself. The National Academy of Sciences, in a 1984 counter-creationist publication, made several universal claims against AECs such as how “the conclusions of creationism do not change” (NAS, 1984: 8). Another researcher reviewed all mention of AECs in the journals *Science* and its now defunct sister publication *The Scientific Monthly* from 1880 until 2000 to determine how AECs were discussed there. After analyzing all the papers, essays, book reviews, and news reports found within these two publications over a 120-year period the researcher concluded “that creationist and evolutionist positions have changed little over time. Scientific developments continue to solidify the evolutionist position, but creationists remain unmoved” (Bleckmann, 2006: 151). This longstanding tendency by the scientific

community to depict AECs as never changing their positions is one of the main longstanding qualities of the folk devil of AEC. Many evolutionists continuously make claims that “in creationism...both authority and revelation take precedence over evidence” (NAS, 1984: 8), or that AECs “keep themselves carefully aloof from any hands-on contact with genuine evidence” (Miller, 2007: 62) due to how “the explanation is seen as unalterable, and evidence is sought only to support a particular conclusion by whatever means possible” (NAS, 1999: 8).

Such claims regarding AECs ignoring evidence or refusing to alter their positions over time are simply ridiculous given how much AEC positions have changed over the 20th century (Numbers, 2006, 2011). Evolutionists will even contradict themselves in their publications while attempting to make this claim. For example, in the same 1984 publication where the National Academy of Sciences claimed AECs never change their positions, an example was provided where one group of AECs refuted the scientific claims of another group based on their own scientific investigations into the phenomenon in question (NAS, 1984). The National Academy of Sciences provided a case study where some AECs claimed footprints of humans existed alongside dinosaur tracks in 90 million year old rock near Glen Rose, Texas. Citing evidence from an article written by a creationist leader, John D. Morris, the National Academy of Sciences explained how “it was subsequently discovered by a young creationist himself that some of the human-looking footprints had been carved by pranksters and that the reportedly convincing ones were no longer present” (1984: 17). Despite repeated claims to the contrary, AECs will refute one another’s claims based on the available evidence. There are also examples of theories and models used by some AEC groups being refuted by others, such as the largely abandoned *canopy model* which suggests that a significant canopy of water existed around the Earth prior to the Noachian flood. As an article on the Answers in Genesis website explains, “the canopy models gained popularity thanks to the work of Joseph Dillow, and many creationists have since researched various aspects of this scientific model. The canopy model was developed from an interpretation of the ‘waters above’ in Genesis 1:6-7 when discussing the firmament (or expanse)” (Hodge, 2009). The canopy model has since been almost universally

abandoned due to acknowledgement that it would be unlikely for a water canopy to have existed given the known variables involved. The website continues,

currently, the pitfalls of the canopy model have grown to such an extent that most researchers have abandoned the model. For example, if a canopy existed and collapsed at the time of the Flood to supply the rainfall, the latent heat of condensation would have boiled the atmosphere! And a viable canopy would not have had enough water vapor in it to sustain 40 days and nights of torrential global rain. (ibid.).

Numbers addresses claims that AECs are uncritical of evidence or simply dishonest directly. He describes how,

critics of creation science have often accused its devotees of lacking ‘a self-critical, self-policing ethos like that of mainstream scientists’ or, worse, of systematically twisting and distorting evidence and sometimes even lying. One sociologist has recently argued that in contrast to the larger scientific community, which has agencies to ‘ferret out deception’ and punish offenders, creation scientists are ‘unwilling to punish systematic deception in their very midst’ (Numbers, 2006: 286).

However, while there are counter-examples, such statements present a misleading caricature of AECs, just as an overemphasis on fraud and deception occurring within the scientific community would not be a valid reason to dismiss all scientific findings. Numbers explains that AECs are very critical and generally like to engage “in open and spirited debate” (Numbers, 2006: 368) elaborating how,

rather than condoning sloppy or deceptive work, leaders such as Larry G. Butler (and even Henry M. Morris and Walter E. Lammerts in their own ways) have privately agonized over what one embarrassed creationist called the ‘low grade or pseudo-science [that] has been published by individuals who call themselves Creationists.’...some of the most telling criticisms of creation science have come from creationists themselves and have appeared in their own journals (Numbers, 2006: 286).

Some evolutionists have also claimed that all AECs have certain legislative and/or legal goals. Two scientists wrote how “creationists generally believe...that the state (that is, either the legislature or the courts) has the right to decide whether any theory is scientifically valid or not. Thus, creationists argue...that the state has the right to decide that evolutionism must be censored as a dogmatic religious belief and equal time given to creationism as a valid scientific theory. Creationists argue that either both should be taught in the public schools, or neither” (Root-Bernstein & McEachron, 1982:

413). As only some Young Earth Creationists have been involved in equal-time legislation (Numbers, 2006), and the flagship ID organization, the Discovery Institute, has taken an official position that AEC should not be introduced to schools at the present time (Meyer, 2017), such descriptions are fallacious.

Lastly, many evolutionists have attempted to limit the folk devil of AEC to the United States. In other words, after creating a mythologized folk devil, they then limit its environmental surroundings to the U.S. as well. Despite the spread of AECs to other countries as early as the 1920s (Numbers & Stenhouse, 2004), coupled with the rapid expansion of AEC organizations internationally since the early 2000s (Numbers, 2011), the claim that AEC and even antievolutionism in general (Futuyma et al., 1998) is unique to the United States is only sustainable if almost all available evidence on this subject is ignored (National Science Foundation, 2012; Numbers, 2006). Nevertheless the famous scientific popularizer and evolutionist, Bill Nye, recently stated that “the denial of evolution is unique to the United States” (2016). This position is continuously promoted by the scientific community as well. A large and influential working group of scientists made the claim that despite evolution being controversial in the U.S., “evolution is hardly controversial in many other countries” (Futuyma et al., 1998: 51). This claim that AECs and their activities are limited to the United States (Coleman & Carlin, 2004) gives the impression that the folk devil of AEC is regional in scope and, for the most part, unable to gain adherents outside of the U.S. This, again, feeds back into the victor’s historical narrative evolutionists wish to present. If AEC organizations were never able to expand outside of the U.S., and they have suffered defeat after defeat within the U.S. (Scott, 2009; Zimmerman & Loye, 2011), then they must be almost eliminated at present. Numbers summarizes the situation stating,

Critics of creationism used to console themselves with the belief that the movement would never go global. As late as 2000 Stephen Jay Gould was taking comfort from the thought that this ‘local, indigenous, American bizarrrity’ was ‘not a worldwide movement.’ Already, however, it was spreading beyond the confines of the United States (Numbers, 2011: 136).

3.5 Describing Evolution

The folk devil of AEC coupled with the victor's historical narrative has served to hinder the scientific community's ability to engage with AECs in a constructive fashion. Rather than studying, utilizing the available research, and engaging with AECs so the two sides can better understand one another, many evolutionists have instead sought to construct, promote, and attack a completely inaccurate and mythologized folk devil instead. This enables evolutionists to dismiss AEC worldviews and arguments by undermining their trustworthiness and scientific credibility while assisting with the creation of moral panics when the need arises. This situation is compounded by disputes regarding what is included in evolutionary theory (Laland et al., 2014), and how best to describe it to scientists or the public (Bock, 2007; Getz, 2006; Jean & Lu, 2018).

Evolutionists, despite their spirited defense of the teaching of evolution (Forrest, 2008; Scott, 2009), have a seeming inability to convey to other scientists, legal experts, and the public exactly what evolution is (Bock, 2007). Beyond the vague agreement that evolution means change over time (NAS 1999; Scott, 2009), the actual breakdown of evolution used by most evolutionists is continuously contested by other biologists, philosophers, and science popularizers (Bock, 2007; Getz, 2006; Jean & Lu, 2018). The biologist W. J. Bock wrote when reviewing how evolution was discussed in the *McLean* and *Kitzmiller* trials that what was "most interesting in these two trials was the spectrum of meanings given to the Theory of (Biological) Evolution which varied so much that one could be surprised that any decisions could be reached at all in these trials" (2007: 89). Bock emphasizes the importance of a consensus view of evolution within the scientific community stating "if evolutionary biologists and philosophers of science present clearly and completely evolutionary theory in all of its fascinating diversity, then at least we know where the arguments are and which views are based on science and which on belief" (Bock, 2007: 101). In other words, if biologists and philosophers could only agree on a standardized way of presenting evolution, rather than a myriad of contradictory ways (Jean & Lu, 2018), then it would be easier to determine how to distinguish between evolution, evolutionism, and AEC worldviews.

In the evolution-creation controversy literature evolution is regularly broken down into three standard components: theory, fact, and evolutionism (Ruse, 2005). The most agreed-upon component is that evolution is a single theory which changes over time to

explain the data related to evolutionary biology (Klayman et al., 1986). The second component, which is increasingly disputed among the scientific community, is that evolution is a fact (Jean & Lu, 2018). Thirdly, there is increasing recognition that evolutionism has always existed within evolutionary biology (Miller, 2007; Ruse, 2005). Unfortunately, the first two claims are highly problematic, even among biologists (Bock, 2007; Getz, 2006; Lewis, 1998), and the third is frequently dismissed with statements such as how “evolution has been used (abused, we would say) to justify both communism and capitalism, both racism and egalitarianism. Such is the grip of the evolutionary concept on the imagination” (Futuyma et al., 1998: 32). Such dismissals ignore the pervasive and longstanding trend of famous and influential evolutionary biologists using evolution to promote their own versions of evolutionism since Darwin’s publication of *Origin* (Ruse, 2005).

Even the standard explanation that Darwin described a single scientific theory in *Origin* (Klayman et al., 1986; NAS & IM, 2008; Scott, 2009) has been disputed. “Because Darwin always referred to his ideas as my theory...always in the singular – almost all workers accepted the existence of only single theory of biological evolution which was regarded as being strictly historical” (Bock, 2007: 90). Experts who describe evolution to the public generally still refer to it as a single theory (Ruse, 2005; Scott, 2009), as do prestigious scientific working groups such as the one especially assembled to describe evolution to “decision makers responsible for guiding basic and applied scientific research and for developing educational curricula at all levels” (Futuyma et al., 1998: 4). In addition, the *amicus curiae* brief for the *Edwards* court case, which is the most authoritative scientific consensus ever made (Shermer, 1991), also recognized it as a single theory (Klayman et al., 1986). More recently, the National Academy of Sciences and the Institute of Medicine have also described evolution as a single theory as well (2008).

This presentation of evolution as a singular theory is very problematic however, as this description is disputed within the scientific and philosophy of science literature. Bock explains how “Darwin proposed a set of at least five different evolutionary theories, not just one, as advocated by Mayr (1985) which can still be used today to characterize the major, independent evolutionary theories” (2007: 90). Another

biologist, Ralph W. Lewis explains how evolution is comprised of “the major theories and the hundreds of subtheories found in the study of evolution” (1988: 34). One biologist went so far as to publish a peer-reviewed article in the journal *BioScience* titled “The ‘Theory of Evolution’ Is a Misnomer” (Getz, 2006). The biologist T. Ryan Gregory describes the present situation,

Because of this complexity, biologists rarely make reference to ‘the theory of evolution,’ referring instead simply to ‘evolution’ (i.e., the fact of descent with modification) or ‘evolutionary theory’ (i.e., the increasingly sophisticated body of explanations for the fact of evolution) (2008: 50).

Perhaps the most telling example of how disputed the description *theory of evolution* is at present is how the scientific community cannot seem to agree on whether evolution is a single theory or multiple theories. The most inclusive engagement the scientific community has used to determine an accurate description of evolution derived from a scientific working group collected from the membership of eight scientific societies in the mid-1990s. This group created the paper “Evolution, Science, and Society: Evolutionary Biology and the National Research Agenda” in 1996; sent it to their respective organizations for critique and revision, while also posting it online in 1997 and inviting other scientists to do the same; finally issuing a final draft in 1998 (Futuyma et al., 1998). The end result used both descriptions as if they meant the same thing: “the single unifying theory of biology” (Futuyma et al., 1998: 5) and “evolutionary theory” (ibid.: 6).

Beyond the dispute over descriptors, the scientific community is also presently disputing the actual content of evolution. There is presently a disagreement between those evolutionary biologists who advocate for “the extended evolutionary synthesis (EES)” (Laland et al., 2014: 161) and those who advocate for the “modern synthesis” or “standard evolutionary theory (SET)” (ibid.: 162). The group advocating for EES claims “an alternative vision of evolution is beginning to crystallize, in which the processes by which organisms grow and develop are recognized as causes of evolution” (ibid.: 161). The most interesting aspect of this discussion was how the two groups of evolutionary biologists could not agree on what was included and excluded in present evolutionary theory. Advocates of EES attributed the negative reactions by evolutionary biologists to the need to maintain a symbolically united front against AECs; which is likely the reason

why descriptors of evolution are often not updated over time. The EES advocates (Laland et al., 2014: 162) explained how,

the mere mention of the EES often evokes an emotional, even hostile, reaction among evolutionary biologists. Too often, vital discussions descend into acrimony, with accusations of muddle or misrepresentation. Perhaps haunted by the spectre of intelligent design, evolutionary biologists wish to show a united front to those hostile to science.

The second component of evolution, the fact of evolution (Ruse, 2005), is now widely recognized as a confusing and misleading descriptor of evolution (Bock, 2007; Lewis, 1998; Scott, 2009). Instead of being a useful means of describing evolution, referring to it as a fact is instead a means by which the scientific community has, over the past 140 years, sought to encourage the public's belief in the certainty of evolution (Jean & Lu, 2018). In his assessment of how evolution was referred to as a fact, Lewis concluded that "the term fact as commonly applied to such statements signifies not the kind of content in the statements but, rather, the strength of our acceptance of the statements" (1988: 34). In other words, there are no common criteria by which evolution is determined to be a fact. The very claim that evolution is a fact contradicts several of the most authoritative scientific consensuses in history (Jean & Lu, 2018).

Scientists and scientific popularizers who do refer to evolution as a fact, have not bothered to create a standard means of explaining what a fact is, how evolution is a fact, or when it became a fact (Jean & Lu, 2018). Despite this free-for-all mentality of those who describe evolution as a fact, the need to maintain the above mentioned 'united front' against AECs has emboldened the scientific community to allow a 'critique-free zone' wherein it is rare for scientists to receive any critique on their rationales, definitions, or conclusions to justify how evolution is a fact (ibid.). Consequently, throughout the fact of biological evolution discourse, evolution is claimed to be a fact based, holistically or in part, upon it being: the truth (Coyne, 2009; Futuyma et al., 1998), reality (Montagu, 1981; Sagan, 1980), a historical fact (Huxley, 1880; Miller, 2007), an extremely probable idea (Eldredge, 1982; Gould, 1981; Muller, 1959), a collection of facts (Huxley, 1931; Lenski, 2000), a well-substantiated hypothesis (Antonites, 2010; Barnosky & Kraatz, 2007; Futuyma, 1985), a well-substantiated theory

(Conn, 1887; NAS & IM, 2008), a former theory (Graffin & Olson, 2010; Lewontin, 1981), or a common sense fact (Dawkins, 2009; Moran, 2002).

All of these rationales and definitions can be collected together into three categories. Evolution, when described as a fact, is conceptualized as: 1) a fact, not a theory (Dawkins & Milner, 2005; Graffin & Olson, 2010; Lewontin, 1981; Muller, 1959); 2) a fact and a theory (Barnosky & Kraatz, 2007; Coyne, 2009; Gould, 1981; Huxley, 1931; Futuyma, 1985; McComas, 1997; NAS & IM, 2008); and 3) a fact, theory, and path (Gregory, 2008). Obviously the most troubling aspect of these categorizations is how evolutionary biologists such as the Nobel laureate, H. J. Muller, the Harvard biologist Richard Lewontin, or the highly influential biologist and science popularizer, Richard Dawkins, are all willing to claim that evolution is not a theory; thereby contradicting every authoritative statement made about evolution in the last several decades (Futuyma et al., 1998; Klayman et al., 1986; NAS & IM, 2008).

Lastly, there is the increasing recognition that evolutionism has existed and been reacted to by AECs and other religious scientists for some time now (BioLogos, 2017; Davis, 2005; Ham & Hall, 2012; Park, 1997). Ruse explains how many 19th century scientists, against the wishes of Darwin, turned evolution into a type of religion or ideology which was then used to attack religious beliefs and practices (2005). This practice was so systematic evolutionary biologists in the mid-20th century “would publish two sets of books. One professional, with no hint of progress. One popular, with much talk of progress. Two messages, for two audiences” (Ruse, 2005: 187). One popular example was the book published by the eminent evolutionary biologist G. G. Simpson, *The Meaning of Evolution*, in 1949. Based on his personal philosophy of evolutionism, Simpson discussed the qualities of “true religion” (1949: 5) and proceeded to elaborate upon how “man is the result of a purposeless and materialistic process that did not have him in mind. He was not planned” (1949: 344). Eventually Simpson seemed to leave evolution completely behind in his book discussing how his evolution-derived ethics “stand in strong opposition to authoritarian or totalitarian ideologies. They confirm the existence of many evils in current democracies, but the good state, on these principles, would inevitably be a democracy” (1949: 347).

The eminent theologian and philosopher, Alvin Plantinga, attributes much of the perceived conflict between evolutionists and AECs to evolutionism. “This confusion or alleged connection between Darwinism and unguided Darwinism is perhaps the most important source of continuing conflict and debate between science and religion...when Dennett, Dawkins, and their friends go on to add that the process is unguided by God or any other intelligent agent, then, of course, conflict and inconsistency arise” (Plantinga, 2009: 115). While admitting that there is no necessary conflict between Christian scriptures and evolution, it is “this confusion between Darwinism and unguided Darwinism [which] is a crucial cause of the continuing debate” (Plantinga, 2009: 116). However, this source of conflict is unnecessary as “unguided Darwinism, a consequence of naturalism, is incompatible with theism but is not entailed by the scientific theory. It is instead a metaphysical or theological add-on” (ibid.). Scott (2009: 75) arrives at similar conclusions stating,

Just as attempts to explain the natural world through revelation cause friction with scientists, so materialist scientists cause friction with religious people when they make statements about the ultimate nature of reality – when they speak as if they speak for science itself. On reflection it should be recognizable that if science has the limited goal of explaining the natural world using natural causes, it lacks the tools to make justifiable statements about whether there is or is not a reality beyond the familiar one of matter and energy.

While willing to recognize that occasionally scientists and others use evolution in this manner (Futuyma et al., 1998), the scientific community has done little to critique such claims. Scientists will periodically make statements which indirectly contradict evolutionism (Klayman et al., 1986; NAS & IM, 2008), but evolutionism has become tied together with the anti-religious culture of science at present. Miller describes a “reflexive hostility of so many within the scientific community to the goals, the achievements, and most especially to the culture of religion itself” (Miller, 2007: 166-167). This has led to a pervasive evolutionism found within many, if not most, scientific books describing evolution, especially those which describe evolution to the public (Miller, 2007).

Evolutionism is common in many books describing evolution, and is even occasionally described as fundamental to it. As described in the Oxford series book *Evolution: A Very Short Introduction*, “the biological explanation of the origin of

adaptation replaces the idea of a Designer, and is central to the post-Darwinian evolutionary biology” (Charlesworth & Charlesworth, 2003: 62-63). Additionally, science teachers often assume evolution and evolutionism are the same thing. From the early 1980s to the late 1990s the eight-thousand-member National Association of Biology Teachers slowly learned to, officially at least, differentiate between the two;

In a position statement initially adopted during the 1980s in opposition to the creation-science movement...the association defined evolution as ‘an unsupervised, impersonal, unpredicted and natural process of temporal descent with gradual modification.’ In 1997, responding to the intelligent design movement, the associations leadership committee voted to delete the words *unsupervised* and *impersonal* from their statement. The group’s executive director explained, ‘To say that evolution is unsupervised is to make a theological statement,’ and that exceeds the bounds of science (Larson, 2006: 275; emphasis in original).

All these evolutionism claims occur while scientific societies and authoritative collections of scientists explain how,

Science is not equipped to evaluate supernatural explanations for our observations; without passing judgment on the truth or falsity of supernatural explanations, science leaves their consideration to the domain of religious faith. Because the scope of scientific inquiry is consciously limited to the search for naturalistic principles, science remains free of religious dogmas and is thus an appropriate subject for public-school instruction (Klayman et al., 1986).

Such statements describing scientific neutrality on religious beliefs and understandings serve, not to create a form of scientific neutrality regarding the interpretation of scientific data and findings, but instead serve to bias the legitimacy of such interpretations in favor of those who interpret scientific knowledge from a philosophically materialist perspective rather than any given religious perspective. As Miller states, “Apparently it is fine to take a long, hard look at the world and assume scientific authority to say that life has no meaning, but I suspect I would be accused of anti-scientific heresy if I were to do the converse, and claim that on the basis of science I had detected a purpose to existence” (2007: 269). Consequently, authoritative claims to scientific neutrality, coupled with a historical tendency for those within the scientific community to promote evolutionism and attack religious beliefs (Morse, 1887; Ruse, 2005; Tyson, 2011), has led to a situation where philosophically materialist interpretations of science are accepted and even actively encouraged (Larson &

Witham, 1999; Pruett, 1999), while religious interpretations are harshly attacked (Miller, 2007; Numbers, 2006).

A simple reading of the available literature on how evolution is described in the evolution-creation controversy reveals a confusing morass of contradictory descriptions, both obvious and subtle attacks on religious beliefs, and a scientific community which seems unwilling to update, critique, or police these failings in favor of attempting to present a united front in the face of AEC counter-hegemony. A large part of the problem is that scientific terminology itself can be very confusing; scientific terms such as theories, facts, and hypotheses are traditionally vague terms (Falk, 1988) which have historically been difficult to distinguish from one another. In 1967, Muller demonstrated a scientific consensus on this point by obtaining the signatures of one-hundred and seventy-seven scientists in support of a statement which, in part, declared “instead of there being sharp lines separating ‘hypothesis,’ ‘theory,’ and ‘fact,’ there is a sliding scale of probabilities” (Muller, 1967). Consequently, as evolutionists attempt to describe evolution to the public, disputes can easily arise regarding whether evolution is a single theory, multiple theories, or whether it involves theories at all. Given this situation, it is unsurprising that so many people around the world find evolution unconvincing (NSF, 2012). In addition, as evolutionism has remained largely unchecked within the scientific community, AECs continue to justifiably reject the religious beliefs they perceive as linked to evolution (Ham & Hall, 2012). This is why Ruse described the evolution-creation controversy as “no simple clash between science and religion but rather between two religions” (Ruse, 2005: 287), and the founder and Young Earth Creationist leader, Ken Ham, also emphasizes the pervasiveness of evolutionism explaining how,

the famous evolutionary scientist Ernst Mayr writes, ‘The Darwinism revolution was not merely the replacement of one scientific theory by another, but rather the replacement of a worldview in which the supernatural was accepted as a normal and relevant explanatory principle by a new worldview in which there was no room for supernatural forces.’...This is how science became dishonest (Ham & Hall, 2012: 59).

3.6 The Direction of Institutionalization of the Evolution-Creation Controversy

The successful counter-hegemony of AECs is evident in how they have managed to drastically limit standardized instruction of evolution to only 28% of biology

classrooms in high schools across the U.S. (Berkman & Plutzer, 2011), the successful implementation of antievolutionist educational policies in Canada (Barker, 2004), as well as the massive numbers of supporters they have convinced of their worldview in North America (Angus Reid, 2012; Gallup, 2014) and around the world (Numbers, 2006). However, public support for these worldviews is diffuse throughout Canada and the U.S. (Alders, 1999; Angus Reid, 2012) and only a minority of the U.S. population adopts AEC positions dogmatically (Hill, 2014). Consequently, these successes are largely due to the successful development and growth of AEC organizations and outreach, as well as the failure of appropriate organizational responses from the scientific community (Park, 1997).

The AEC movement is typically widely spread across the U.S. and Canada; it is distinct from political leanings (Alders, 1999), not significantly correlated with other “antiscience” views such as climate change skepticism (Ecklund et al., 2016: 1), is not based in any single religious denomination (Numbers, 2006), and represents a myriad of different religiously-based worldviews often held at the level of the individual or church level (Alders, 1999; Hill, 2014). As one researcher explained of AECs in the U.S., “half the country is certainly not made up of religious fundamentalists (let alone literalist fundamentalists) nor political conservatives...therefore, it appears that rejection of evolution is non-partisan” (Alders, 1999: 103). While the majority of AECs derive from Evangelical Christianity, AECs also derive from a multitude of non-evangelical Christian denominations, as well as from other religions (Numbers, 2006). While there are many Christian leaders who denounce AEC worldviews (Sager, 2008; Scott, 2009); the wider Christian community is not quite opposed to it. Brian J. Alters explains how “Christianity Today is not a fundamentalist-literalist periodical; its readers span the continuum of evangelical theology and therefore it enjoys one of the highest circulations of all Christian magazines” (Alders, 1999: 103). Despite this, its 1972 book of the year was the Young Earth Creationist seminal work *The Genesis Flood* and its 1997 book of the year was the Intelligent Design seminal work *Darwin's Black Box: The Biochemical Challenge to Evolution* (ibid.). In addition, “in *Christianity Today* are full-page advertisements for Phillip Johnson's *Defeating Darwinism by Opening Minds*. The advertisements state that Johnson... ‘shows how ordinary Christians can defeat the

false claims of Darwinism” (Alders, 1999: 103; emphasis in original). This situation led Alders (1999: 103-104) to conclude,

contrary to the popular characterization that anti-evolutionism is just primarily of fundamentalist-literalist concerns, it appears that it is a very important part of the larger Evangelical Christian community...As such, it would be difficult, if not impossible, to construct a concise system attempting to label the myriad Evangelical views for rejecting evolution.

The active support of certain types of AEC worldviews and outreach has always been almost entirely dependent upon AEC organizations dedicated to them (Numbers, 2006). As the early AECs discovered from their first attempt at creating a major AEC organization, the short-lived Religion and Science Association, AECs rarely agree completely on the presently available science or their theological interpretations of scripture (ibid.). As a consequence, all large AEC organizations since 1937 have limited their membership to only those who are willing to agree to particular worldviews presented in statements of faith (ibid.). Without these agreements, it is likely these AEC organizations could not exist without continuous doctrinal disputes and infighting. However, this tactic also serves to effectively limit their scriptural interpretations, internal discussions, and outreach, as well as what kinds of scientific discoveries and conclusions they can accept. It is difficult for these organizations to radically alter their worldviews with new scientific data, dialogue, and critique. Essentially this creates a series of hermetically sealed ‘echo-rooms’ where AECs who join such organizations are unable to challenge the worldviews their organizations are based upon.

There are, however, rare situations where institutional space has been created within organizations where AECs have been allowed to discuss and critique their own and other’s worldviews. When this has occurred, it has led to a radical liberalization of the worldviews held by the organizational membership (Numbers, 2006). The American Science Affiliation was one such organization. Founded in 1941 by evangelical scientists, its founders “devoted more energy to appraising than to opposing evolution” (Numbers, 2006: 180). From its founding until the 1960s the American Science Affiliation was used as “the principal evangelical forum for discussing the pros and cons of evolution and for evaluating the critiques of George McCready Price and Harry Rimmer” (ibid.). This was allowed because the American Science Affiliation had never

taken an official position on evolution, geology, or how science in general relates to the Bible (Numbers, 2006). While “the founders seem[ed] to have favored personally a literal reading of the creation story and in the beginning assured at least one prospective member that ‘the stance of the society would be anti-evolutionary’” (Numbers, 2006: 194); by the late 1940s and 1950s, “the society was moving rapidly in the direction of theistic evolution, with some members stopping off at what they called ‘progressive creation’” (ibid.: 194-195). Such institutional spaces for open dialogue and critique appear to be the most successful means by which AECs become less radical in their worldviews, as well as more able and willing to accept scientific findings and data (Numbers, 2006).

Although such institutionalized spaces for dialogue between scientists and AECs appear to be very successful, the institutionalized responses by the scientific community have instead centered on dismissing AEC worldviews and arguments, while suggesting that the reason AECs exist is due to a misunderstanding of science (NAS & IM, 2008). One illustrative example occurred when initially AECs were granted a forum to discuss and debate their worldviews and arguments with members of the scientific community at the annual National American Biology Teacher convention in 1972 and in their journal *American Biology Teacher*. The controversial claims made, coupled with the backlash over presenting AEC worldviews and arguments, led to AECs being banned from these forums the following year (Park, 1997).

Despite how scientists and science teachers cannot seem to be able to teach evolution effectively to the general public, university students, or professionals (Moore & Cotner, 2009; Nehm & Reilly, 2007; Trani, 2004), the standard response of the scientific community is to call for more education on evolution (Futuyma et al., 1998). This continued insistence that AECs are people who simply do not, or do not want to, understand evolution has led to copious amounts of scientific societies officially rejecting AEC worldviews (Sager, 2008), and the creation of a myriad of anti-creationist organizations which are essentially mirror images of AEC organizations (Forrest, 2008); creating, in effect, two systems of entrenched organizations whose only purpose is to attack one another’s worldviews. Unfortunately, neither of these responses is conducive to institutionalized dialogue.

The wholesale dismissal of AEC worldviews is the most obvious impediment to dialogue between evolutionists, other scientists, and AECs. All forms of dialogue between the two sides is actually discouraged by many scientists due both the folk devil of AEC and the widely perpetuated myth that science and religion have always been in a state of perpetual conflict (Coyne, 2012; Turner, 1978). In a recent article, the famous physicist and science popularizer, Neil DeGrasse Tyson states, “let there be no doubt that as they are currently practiced, there is no common ground between science and religion. As was thoroughly documented in the nineteenth century tome, *A History of the Warfare of Science with Theology in Christendom*, by the historian and one-time president of Cornell University Andrew D. White, history reveals a long and combative relationship between religion and science, depending on who was in control of society at the time” (2011). Such anti-religious views discourage any attempt at dialogue and have been commonplace within the scientific community since the 19th century. As one article published in *Science*, which was also based on Dr. White’s writings, stated,

Judging by centuries of experience, as attested by unimpeachable historical records, *it is safe enough for an intelligent man, even if he knows nothing about the facts, to promptly accept as truth any generalization of science which the Church declares to be false, and, conversely, to repudiate with equal promptness, as false, any interpretation of the behavior of the universe which the Church adjudges to be true.* In proof of this sweeping statement, one has only to read the imposing collection of facts brought together by Dr. White (Morse, 1887: 75; emphasis added).

The fundamental problem with these present and historical claims is that they have been completely rejected by most of the eminent historians of science and religion (Barbour, 2000; Brookes, 1991; Harrison, 2006). The biggest problem is that, both in the past and presently, clearly differentiating between ‘scientific’ and ‘religious’ issues as being the causal factor in any social conflict is almost impossible (Numbers, 1985; Shapiro, 2008). The historian John Hedley Brooke explains how “debates so often construed in terms of an essential ‘conflict between religion and science’ usually turn out to be something else – and far more interesting. The real issue is the cultural meaning of scientific conclusions, which need not be identified with the views of scientific or religious extremists” (1998: 1985-1986). Such findings are why Numbers has declared the “warfare thesis,” as it has come to be called, “historically bankrupt”

(Numbers, 1985: 80). Another historian links the warfare thesis directly to the evolution-creation controversy by explaining how,

the Draper-White approach to historiography is not so much a lens that brings its subject into focus as it is a fun-house mirror that distorts the image it reflects. It nevertheless continues to be applied to the social history of evolutionary biology. On this telling, the chief battles in religion's alleged war against evolution would be the Wilberforce-Huxley exchange of 1860, the Scopes Trial of 1925 – and today's debates about school curricula (Kemp, 2012: 30).

The warfare thesis has also served as the main interpretative mechanism of the evolution-creation controversy by evolutionists. Shapiro explains how the victor's historical narrative is premised upon the warfare thesis stating,

The complex issues that led to the Scopes trial were lost in the polarizing portrayal of science and religion in irredeemable conflict and a distorted debate over the 'literal' truth of the Bible...The Scopes trial's participants reconstructed the origins of the antievolution movement to suit their own needs. Accepting this framework has resulted in obscuring some of the important trends in biology education and textbook marketing that contributed to the event. It has also enshrined a sense that the trial or something like it was inevitable from the moment someone first put *The Origin of Species* on a bookshelf next to the Bible. This view continues to shape ongoing antievolution controversies, even as these continue to be expressed as policies directed at schools (Shapiro, 2008: 432).

Impediments to dialogue between scientists and AECs, such as the folk devil of AEC, the victor's historical narrative, the antiquated warfare thesis, and the scientific community's unwillingness to directly police or critique the longstanding problem of evolutionism (Ruse, 2005), or its bias towards philosophical materialist interpretations suggests that much of the fault of the present evolution-creation controversy is due to a scientific community which is largely ignorant of the manner in which evolution is presented by many elite scientists to the public, the scientific community's anti-religious culture, or the cultural and historical variables involved in the history of the conflict. The longstanding tendency to simply reject AEC worldviews and arguments based on these criteria has proven so ineffective a tactic that the prolific anti-creationist biologist, Randy Moore, has written that "scientists must do more than label creationism as nonsense and nonscience. Rather than pretend that creationists make no valid claims, scientists must challenge the claims that creationists do make" (Moore, 1999: 333-334). Such a change of tactics would require evolutionists and the wider scientific community to

actually engage in dialogue with AECs by moving beyond the folk devil, the other myths they have adopted (Numbers, 2011), as well as recognizing their own contributions to this conflict of worldviews.

The simplistic claims that AECs are simply ignorant of evolution (Moore, 1999), and therefore increased evolutionary education or exposure to evolution should alter their perceptions, is simply naïve. As one researcher explained, “I do not think that more science education of the standard variety will make much difference. Indeed, it may even do harm...If lack of scientific knowledge is not the root cause, then more science education will not necessarily solve, or even ameliorate, the problem” (Pigliucci, 2007: 291). Such researchers are justified in pointing out that the evolution-creation controversy “is not a scientific controversy” (Pigliucci, 2007: 286), meaning that the scientific community does not perceive there to be a problem with evolution (NAS & IM, 2008). However, it does not follow that, just because the scientific community has no problem with an entrenched tradition of evolutionism, the general public cannot perceive a problem with it. In addition, “it seems that there is little evidence for the ideas that better knowledge of science facts leads to better understanding of the nature of science, or to a lower degree of belief in the paranormal” (Pigliucci, 2007: 293).

Increased dialogue between evolutionists and AECs would allow scientists and science popularizers to understand the need to refute or police the rampant evolutionism present within the scientific community both historically and presently (Miller, 2007; Ruse, 2005). At present, evolutionist outreach is largely made impotent due to an inability to recognize how the “public acceptance of evolution – or any other scientific idea – doesn’t turn on the logical weight of carefully considered scientific issues. It hinges instead on the *complete* effect that acceptance of an idea, a world view, a scientific principle, has on their own lives and *their* view of life itself” (Miller, 2007: 167, emphasis in original). Citing a raft of literature available on the topic, several researchers discussed how,

An individual’s knowledge of science rarely shapes attitudes toward or support for science...Instead, affective factors, such as whether science communicators are perceived as sharing one’s values...views about science in society...or whether communicators are seen as fair...heavily shape public perceptions of science (Johnson et al., 2016: 2-3).

If the scientific community wishes to have increasing members of the public adopting more scientific worldviews, then they need to learn how to relate their information to the public in a manner which does not alienate them. Peter Harrison, the eminent historian of science and religion, addressed this point directly in his 2011 Gifford Lectures explaining,

One of the...features about the rejection of evolutionary thinking by fundamentalist Christians is that a key issue in their rejection is that the values that they believe, rightly or wrongly, to be incipient in evolutionary thinking. Arguably this question of values is far more important than whether evolution squares with the literal truth of Genesis. Religiously motivated opponents of evolution are thus often driven by the perception that evolution necessarily undermines values that they are not prepared to relinquish. These include not only belief in God, but belief in human freedom and moral responsibility, and more generally that life has meaning and purpose. Now it's not difficult to find instances that seem to confirm their suspicions (2011).

In order to engage successfully with AECs in dialogue, the scientific community will need to make two substantive changes to how they presently operate. First, the strategies of outright rejection and attacks against AECs by scientific societies and the more specialized anti-creationist organizations (Forrest, 2008; Sager, 2008) must be abandoned or supplemented with the creation of new scientific organizations which create institutionalized space for engagement with AECs in a similar manner to how the American Scientific Affiliation operated. The second is that scientists must also be trained to engage with the public in a manner which has come to be referred to as *public science* (Gieryn, 1983).

As explained in the introduction, the dispute over evolution is not a 'scientific' dispute, meaning that there is no significant dispute over the use or teaching of evolution within the disciplines of science. Instead, the dispute is one which is occurring mostly outside universities and scientific disciplines, among the wider public. It is this arena, where science and scientific discoveries are presented to non-scientists, which is the realm of public science. Public scientists aim to "provide the interpretative grounds for accepting scientific accounts of reality as the most truthful or reliable among the promiscuously unscientific varieties always available" (Gieryn, 1999: x), but in order to accomplish this task, they must first develop a unique skillset in order to effectively

relate scientific information to the public in a manner which they can understand and accept.

Obviously being a professional public scientist requires a very different skillset from being a research scientist (Gieryn, 1999; Shermer, 2002). Not only would the scientific community need to develop a means of professionalizing such representatives, but they would also need to alter the very prominent cultural taboo involved with public science: a phenomenon which has been termed the “Sagan Effect” (Shermer, 2002: 490). The historian of science, Michael Shermer explains how the commercial success of Carl Sagan was so great that “a ‘Sagan Effect’ took hold in science, whereby one’s popularity and celebrity with the general public were thought to be inversely proportional to the quantity and quality of real science being done” (ibid.). Despite how “the ‘Sagan Effect’, at least when applied to Sagan himself, is a Chimera” (Shermer, 2002: 493), the phenomenon described is very real and leaves many scientists and science students unwilling to engage in much public science (Ecklund et al., 2012). Although the term makes special reference to Sagan, the phenomenon to which it refers dates back to the turn of the 20th century. The Edward B. Davis (1995: 224) writes,

By 1900...popularizing activity had fallen off markedly. The German model of higher education had captured the American mind, prestige was being transferred from teaching to pure research, and men (all too rarely women) with the training and ability of Samuel Christian Schmucker ordinarily put all of their energies into the search for new knowledge rather than the public dissemination of what was already known.

Consequently, the scientific community has many hurdles to overcome in order to professionalize public scientists to make use of any institutionalized space they create for dialogue. The taboo status of public science must change, as well as the tendency of the scientific community to ignore developments within public science until the worldviews being promoted within it become problematic (Scott, 1997). Traditionally public science has been viewed as “a low status activity, unrelated to research work, which scientists are often unwilling to do and for which they are ill-equipped” (Shermer, 2002: 494). This has left public science a completely unaccountable arena wherein scientists regularly contradict established scientific consensus as well as each other

(Jean & Lu, 2018). It is only recently that scientists have been given a voice by which to critique public scientists via large-scale open-ended interviews, where many scientists took the opportunity to critique the public science of Richard Dawkins (Johnson et al., 2016). Seemingly for the first time it has been shown that there is a need to police public scientists and make them accountable to the wider scientific community, as they do not appear to be accurately representing the views of many, perhaps the majority, of scientists (ibid.). This situation also, in part, explains how so many public scientists are able to promote evolutionism despite the condemnation of such activities by the wider scientific community (NAS & IM, 2008).

In summary, the scientific community has had a large role to play in the creation and perpetuation of the evolution-creation controversy. Despite their claims to neutrality, they have demonstrated bias for philosophical materialist interpretations of science; an adherence to antiquated ideas concerning the relationship of science and religion; a pervasive ignorance of AEC worldviews and arguments; utilization of a widely-perpetuated folk devil and victor's historical narrative; as well as recommendations to resolve the evolution-creation controversy which contradict much of the available research on the public acceptance of science. This has led to the creation of institutions and organizations which are designed to attack and counter AEC outreach rather than to engage with them in a constructive and educational fashion. Such tactics have allowed the scientific community to avoid their own shortcomings, biases, and misunderstandings in this controversy; thereby failing to recognize much more fruitful modes of engagement which have occurred historically. These issues form the social milieu within which AECs engage in their worldview promotion and outreach activities and must be understood to provide context for their understandings and actions both historically and presently. Devoid of such context, researchers would have to rely upon general readings to provide context for research on AECs; a mistake which would cause them to fall victim to all the problems cited above.

Chapter 4: Theory

4.1 Public Science

There is a general structuring to the evolution-creation controversy which serves to generally unite the individuals, groups, and organizations which represent the evolutionist side, and which also serves to delineate the evolutionists from the AECs, their groups, and organizations as well. As AECs are both legally and pragmatically excluded from mainstream scientific activities, scientific instruction, and scientific funding (Numbes, 2006; Scott, 2009), this controversy must be recognized as not occurring within scientific institutions. Instead, it occurs externally to scientific institutions and it operates according to the professional goals different individuals, groups, and organizations have with promoting different maps of scientific knowledge and activity to different audiences at different times. Seen through this theoretical framework, one can gain an appreciation for why the evolution-creation controversy has played out in the manner it has, what the interests of the different players are, and how to begin to address the social problems caused by the controversy. More specifically, it provides a window into the social milieu which the regional and local AEC groups and organizations operate; providing an understanding of which maps of science are adopted amongst themselves, why they are adopted, and which maps of science they are reacting to.

Public science is a distinct arena of engagement between the scientific community, other interest groups, and the general public (Gieryn, 1999). The evolution-creation controversy represents a public science controversy and the individuals, groups, and organizations involved with interpreting science to the public are public scientists. Because scientific research and journal articles are largely unintelligible to the public and even among scientists who do not share the same arena of specialization (Ecklund et al., 2012; Gieryn, 1999), there are those who must present scientific findings and data to the public by making it intelligible to them. Both evolutionists and AEC advocates are public scientists, with each side representing their own interpretation of scientific data and findings to the public (Scott, 2009). Both

professionals and nonprofessionals can be public scientists, but in order to engage in public science, their audiences must be either nonscientists or non-experts in the areas being discussed. If scientists are explaining science to other scientists than that is simply 'science' and not public science. Public science can occur in almost any location: in churches, universities, courts, social media, books and articles, businesses, in clubs, and numerous other venues, and it is almost entirely unregulated, except to the extent to which one can break laws or be held accountable to their employers or organizations they belong to (Scott, 2009). As a consequence, there is no qualification for being a public scientist. Many public scientists, such as Carl Sagan or Stephen Jay Gould, were credentialed and practicing research scientists (Shermer, 2002); Richard Dawkins and Neil deGrasse Tyson are credentialed but not practicing scientists; others such as Scott are social scientists (Scott, 2009); and some, like Ken Ham, have no scientific qualifications whatsoever (Ham & Hall, 2012).

The influence and following of any particular public scientist are not necessarily dependent upon having scientific credentials. While traditionally evolutionists have held university degrees, as well as typically holding professor positions at universities and colleges (Scott, 2009); AEC advocates have traditionally ranged along a continuum from those with scientific degrees and/or university professor positions, to those who have no scientific post-secondary education at all (Numbers, 2006). Although most of the major AEC organizations, especially since the AEC revival in the 1960s, show favoritism towards those with scientific credentials (*ibid.*), there are leaders of AEC organizations who proudly proclaim their lack of scientific or other academic credentials. The president of AiG, Ken Ham, who leads one of the largest and most successful AEC organizations (Scott, 2009), lauded his own lack of scientific and theological credentials stating,

In some ways I'm glad that I don't have those credentials, because I might have ended up like some of them: compromising the truth clearly laid forth by Scripture in the midst of a bunch of academic mumble jumble created to accommodate secular scientific ideas (Ham & Hall, 2012: 129).

Public science is engaged in to achieve particular professional goals. These goals, according to the sociologist Thomas Gieryn, are the "acquisition of intellectual authority and career opportunities; denial of these resources to 'pseudoscientists'; and

protection of the autonomy of scientific research from political interference" (Gieryn 1983:781). These goals can be pursued with different audiences and for the obtainment of particular goals in a wide variety of settings: from courtrooms, to books, to lectures, debates, television programs, and high school textbooks; all are examples of public science. Although Gieryn was basing his analysis on those public scientists who represent the hegemonic scientific community, his analysis still holds for AEC advocates as well. Many AEC organizations have created independent scientific communities based upon their AEC worldviews, along with research institutes, their own peer-reviewed journals, and a raft of literature supporting their positions and arguments (Numbers, 2006). As such, they wish to obtain legitimacy, career opportunities, deny resources to the hegemonic scientific community, and gain a degree of autonomy from political interference as well.

Public scientists attempt to achieve their professional goals by presenting their audiences with particular descriptions, interpretations, predictions, and the results of scientific knowledge and activities. This is done by creating maps of scientific knowledge and activity referred to as "cultural cartography" (henceforth 'cartography') (Gieryn 1999:5). Cartographies are utilized to convince the public, and even other scientists, of the validity of particular worldviews, outreach, and research agendas (ibid.). Consequently, they are meant to alter how the public, policy makers, and other scientists understand scientific knowledge, discipline(s), and research. This is often done with the intention of changing the status of other knowledge disciplines, occasionally denying them the label science or labeling them as pseudo-sciences; it can also affect the scientific education provided to the public and determine the types of funding available for scientific activity (Gieryn 1999; Scott 2009).

Cartographies are made by the public scientists themselves as a tool for interpreting and explaining science, what it is, what it has done, and what it can and cannot do, to non-experts in a manner which their audiences can understand and relate to. While being continuously utilized by public scientists, they are often not completely explained or articulated at any given time and therefore are often incomplete or fragmented. Additionally, similar but different cartographies are often utilized by the same public scientist to different audiences in order to highlight certain aspects of

science or to downplay other aspects, which in turn elicits different responses from those audiences (Gieryn, 1999). Still, they are usually presented as definite and unambiguous descriptions of what science either is or should be. Cartographies often involve combining summaries and overviews of science along with the history of science with philosophical perspectives, theological perspectives, ideological goals, and a wide range of critiques and often subjective interpretations (Gieryn, 1999).

The historical and present-day reality of the public science of both the AEC movement and the scientific community is that neither group has a universally agreed-upon cartography. AECs, despite attempts to represent them as a folk devil with a single cartography (NAS, 1984; Ruse, 2005), use a myriad of differing and contradictory cartographies (Scott, 2009). The group stability required in order to enable large AEC organizations to exist is achieved by mandating adherence to a particular cartography in the form of a faith statement (Numbers, 2006). Lacking such a clear cartography in a statement of faith tends to lead to group infighting and the dissolution of the group, or a proliferation of more liberal cartographies which incorporate more scientific discoveries and findings (*ibid.*).

The scientific community, on the other hand, has never had a consistent cartography representing science either. No matter how authoritatively one has been endorsed by prestigious scientists and scientific organizations, and how well advertised such a cartography has been in scientific journals and the wider mainstream media, they are still often ignored by other evolutionists (Jean & Lu, 2018). Different scientific organizations or large groups of scientists will occasionally collaborate to create a cartography, often in response to court cases or other perceived threats to the professional positions of scientists. However, it is common for these cartographies to directly contradict one another in important ways. For example, the three most authoritative scientific cartographies created in the last thirty-one years mention how: scientific hypotheses, not theories, can eventually become facts (Futuyma et al., 1998); scientific theories, not hypotheses, can eventually become facts (NAS & IM, 2008); or scientific hypotheses eventually become theories and neither ever becomes a fact (Klayman et al., 1986). If members of the public were to take the time to inform themselves about how science works, even if they only studied the cartographies

created by large bodies of prestigious and accomplished scientists, it would be almost impossible to gain a coherent understanding of how commonly utilized and core scientific terminology works. Adding in the morass of additional public scientists and evolutionists' cartographies and such a task becomes almost impossible. Gieryn summarizes the situation well by explaining how,

Empirically, the contents of these maps of science become sociologically interesting precisely by their variability, changeability, inconsistency, and volatility – from episode to episode of cultural cartography, few enduring or transcendent properties of science necessarily appear on any map (or in the same place). The contours of science are shaped instead by the local contingencies of the moment: the adversaries then and there, the stakes, the geographically challenged audiences (1999: 5).

The goals of public science, as it relates to both AEC advocates and evolutionists, have not changed over time. Public science is engaged in, i.e. lectures, debates, publishing books and articles, organizing events, lobbying governments and policy-makers, to achieve the professional goals of increased prestige and funding, while denying these to others (Gieryn, 1999). These goals supersede creating and utilizing cartographies which present a clear, or even a coherent, understanding of how science operates; indeed, it is obvious with the examples from the history of science which Gieryn (1999) presents that providing accurate understandings of science, the history of science, and scientific activities has never been the goal of public science cartographies. AECs are guilty of altering their cartographies depending upon which audiences they are presenting those cartographies to. One such example is when Young Earth Creationists and Intelligent Design proponents will deny scriptural influences on their cartographies to some audiences, such as during court trials, while emphasizing its biblical influences to other audiences (Forrest, 2008; Numbers, 2006; Scott, 2009). However, similar research into the cartographies of evolutionists has not received anywhere near the same level of attention. Evolutionists' cartographies are designed, not to best represent scientific consensus or understanding of science, but instead to promote acceptance of evolution, to exclude AEC worldviews, and are also often specially made for particular audiences and times (Gieryn et al., 1985; Jean & Lu, 2018; Numbers, 2006).

There are many examples where public scientists have used contradictory cartographies, sometimes contemporaneously with one another, in order to leave certain impressions about science with different audiences (Gieryn, 1999). One major example of this, which affected the course of the evolution-creation controversy, were the differences in cartographies utilized by scientists at the *Scopes* and *McLean* trials. Gieryn et al. (1985: 392) observe that, “At *Scopes*, scientists differentiated scientific knowledge from religious belief in a way that presented them as distinctively useful but complementary; at *McLean*, the boundary between science and religion was drawn to exclude creation scientists from the profession.” Essentially, as religious views were, around the 1920s, a seemingly legitimate reason to limit the study and teaching of science, the evolutionists’ cartography presented science as different and non-threatening to the religiously devout. But by the 1980s science had achieved such an insurmountable hegemonic status it had come to dominate the education system, and AECs wished to use the prestige of science for their own ends (Shapin, 2006). Consequently, some AECs presented their cartographies as more accurate and scientific than those held by the scientific community (Gieryn et al., 1985). This battle over the respect afforded to science plays out in all areas of the evolution-creation controversy and greatly influences how AEC advocates engage in their public science (Ham & Hall, 2012; Numbers, 2006).

In addition, the *McLean* trial was the first trial to legally define what science is for the purpose of denying the scientific label to AEC worldviews (Numbers, 2006). However, the philosophical criterion of science utilized was very controversial and neglected the latest findings and conclusions of science studies (Pennock, 2009). Numbers explains “the arbitrary way in which Ruse and Overton drew the contested boundaries of science worried some scholars,” and when faced with rebuttals to his cartography by other philosophers of science, Ruse replied that other cartographies, while being more accurate, were “simply not strong enough for legal purposes” (Numbers, 2006: 278). Others have noted how “though Ruse was pleased with the success of his effort to convey demarcation criteria to the court, he was strongly criticized by other philosophers for having put forward a picture of science that had gone out of favor in science studies” (Lynch, 2006: 819). In other words, the cartography of

science was both inaccurate and outdated and therefore was not meant to convey an accurate depiction of what science was to the court. Instead, it was determined to be a useful cartography to present to that particular audience in order to obtain the professional goals of the scientists involved, a gamble which worked (Scott, 2009).

Following *McLean*, this particular way of defining science was almost immediately abandoned. The *Edwards* trial just a few years later did not adopt Ruse's criteria (Moore, 1999), and completely different criteria for identifying the boundaries of science were utilized for the *Kitzmiller* trial. Instead of "an ahistorical formal definition," the *Kitzmiller* evolutionists created "a ballpark demarcation" which was utilized to discount Intelligent Design as science without describing what exactly science is (Pennock, 2009: 183). Robert T. Pennock (2009: 183), who was heavily involved in the *Kitzmiller* trial, explains how,

there was no attempt in *Kitzmiller* to follow Ruse's five criteria from the *McLean* case. Indeed, my recommendation to the legal team from the beginning was to avoid the philosophical problems inherent in Overton's listing of these and to revise and simplify the argument. There were indeed problems with some of the *McLean* criteria, but more than that it was overly and unnecessarily ambitious to attempt to lay out criteria that are necessary and sufficient to define science. Thus, for instance, we made no appeal to falsifiability or tentativeness as scientific litmus tests. Even when we discussed some of the same concepts, such as notions of explanation, natural law and testability, we did so in quite different ways that reflected more current thinking in philosophy of science.

Since the 1980s, one of the most consistent components of the cartographies utilized by evolutionists in major court trials has been explicit mention of scientific hegemony. Moore explains how Judge Overton, the presiding judge for *McLean*, "decided that science is what is 'accepted by the scientific community' and 'what scientists do'" (1999: 97). Moore further concludes that "Overton's decision to defend the scientific community as the appropriate agencies for deciding what does and does not count as science (i.e., that 'science is as science does') was critical" (Moore, 1999: 97) in determining the boundaries of science and rejecting the proposed Young Earth Creationist worldview as not science. This hegemonic criterion was also present in the cartography utilized by Judge Jones in the *Kitzmiller* trial to determine that Intelligent Design was not science as "ID has failed to gain acceptance in the scientific community" (Pennock, 2011: 194). Consequently, one of the most systematic aspects included in

the cartographies adopted by the U.S. legal system is not any specific scientific criteria, but the simple identification of the present scientific community's hegemony over science. In other words, the single most important and agreed-upon aspect of evolutionists' cartographies among scientists and the U.S. judiciary since 1982 has been the tautological argument that science is whatever the scientific community's representatives say it is.

The present situation regarding how cartographies are constructed by evolutionists typically involves a clear separation of science and religion, as well as a nonthreatening stance toward religions, in cartographies presented at court trials (Scott, 2009), by large and prestigious groups of scientists and scientific organizations creating cartographies for the public (Futuyma et al., 1998; NAS & IM, 2008). Meanwhile, at the individual level, a myriad of evolutionists ignore these authoritative cartographies and create their own based upon their personal versions of evolutionism which are used to attack religious beliefs; many researchers who write about the evolution-creation controversy make extensive lists of evolutionists who do this (Graffin & Olson, 2010; Ham & Hall, 2012; Miller, 2007; Ruse, 2005). AEC organizational leaders such as Ken Ham have noticed this trend stating,

there is a growing hostility in educational circles, especially in higher education, toward all things Christian...For example, biologist Dr. Richard Lewontin says of science education:... 'The objective...is not to provide the public with knowledge of how far it is to the nearest star, and what genes are made of. The problem is to get them to reject irrational and supernatural explanations of the world' (Ham & Hall, 2012: 44).

Nevertheless, authoritative cartographies from the scientific community often either dismiss the evolutionism which has permeated the public science writing on evolution or serve to hide it from the public's view. In this way, these aspirational or ideological statements, while possibly well intentioned, are so far removed from the reality of so many public scientists promoting versions of evolutionism that it serves to hide their existence while declaring science as religiously neutral. Statements such as: "science is not equipped to evaluate supernatural explanations for our observations; without passing judgment on the truth or falsity of supernatural explanations, science leaves their consideration to the domain of religious faith" (Klayman et al., 1986); or

“science and religion are different ways of understanding. Needlessly placing them in opposition reduces the potential of both to contribute to a better future” (NAS & IM, 2008: 47); are common in evolution-creation controversy literature. One working group of eight scientific societies stated,

most evolutionary biologists agree that issues of spiritual belief cannot be decided by science, which by its nature is limited to determining natural observable causes, cannot pronounce on supernatural matters, and cannot provide answers to ultimate philosophical or ethical questions...Anti-evolutionists have charged that evolution robs society of any foundation for morality and ethics, and that it teaches a materialistic world view, which would justify the principle that might makes right. But evolutionary science has never taught any such thing, and if properly exercised, cannot teach any such thing, for science in itself has no moral or ethical content, for good or ill (Futuyma et al., 1998: 57).

Unfortunately these cartographies which clearly separate science and religion, which are used by authoritative groups and organizations within the scientific community, are not only misleading regarding the systematic evolutionism promoted by many evolutionists (Ruse, 2005) thereby assisting with its invisibility, but they are also profoundly unhistorical. According to Numbers, such scientific groups and organizations are “Ignoring centuries of history that found the present-day categories of ‘science’ and ‘religion’ thoroughly entangled” (2006: 275). Recently, eminent historians of science and religion have consistently shown how intertwined scientific and religious beliefs, activities, and knowledge have been (Brooke, 1991; Harrison, 2006). Numbers explains it was “not until the 1820s and 1830s [that] books and articles feature[d] the phrase ‘science and religion’ in their titles, a sure sign that the authors were coming to view the two enterprises as independent if related” (2009: 16). It was during this time that “students of nature began referring to their work as science rather than natural philosophy (or natural history)” (Numbers, 2009: 15). As natural philosophy was understood explicitly as a means of understanding God through his works (Harrison, 2006; Numbers, 2009), few if any writers would contrast natural philosophy with religion as the two were basically the same thing (Numbers, 2009). Even with the perceived difference between science and religion beginning in the early 19th century, experts in various scientific fields would openly discuss scripture and God within scientific textbooks until the turn of the 20th century (Larson, 1987).

Presenting science and religion as separate and distinct from one another in these cartographies is not done to present accurate history or the present interrelationship between the two. Instead, it is an attempt to avoid potential conflicts between religious individuals, groups, and organizations and the scientific community. This can clearly be seen when the National Academy of Sciences and the Institute of Medicine state how “science and religion are separate and address aspects of human understanding in different ways. Attempts to pit science and religion against each other create controversy where none needs to exist” (2008: 12). While these types of statements could be interpreted as ideological or aspirational, the lack of any clear definitions regarding what science and religion are, or even how they are distinct from one another, clearly identifies these statements as public science rhetoric designed to avoid controversy and thereby making the obtainment of their professional goals easier.

In summary, the evolution-creation controversy is predominantly a public science controversy over how the boundaries of science and religion are constructed in the varying cartographies created by evolutionists and AEC advocates. This is not to suggest that the evolution-creation controversy has not had a large and lasting effect on how evolution is conceived and interpreted by the scientific community itself (Ehrlich & Holm, 1963; Laland et al., 2014). While the AEC movement is occasionally described as having a single cartography (Ruse, 2005), most evolutionists describe AECs as utilizing multiple cartographies, typically with an organization which adheres to and promotes their cartography in outreach activities (Numbers, 2006; Scott, 2009); and while some evolutionists claim that AEC cartographies never change over time (Bleckmann, 2006; NAS, 1984), they do in fact change regularly (Numbers, 2006, 2011). On the other side of the controversy, evolutionists have created a morass of contradictory cartographies over the 20th and 21st centuries, many of which contradict one another (Gieryn, 1999; Jean & Lu, 2018). Large collectives of evolutionists, such as those defending evolution at court trials or involved in authoritative groups and organizations, tend to utilize inaccurate, outdated, or unhistorical cartographies in order to both achieve their professional goals and to avoid conflicts between different religious and scientific groups (Futuyma et al., 1998; Klayman et al., 1986). At the individual level, however, it has systematically been the case that prestigious and influential

evolutionary biologists have chosen to create cartographies which attack religious worldviews based upon their own particular versions of evolutionism (Miller, 2007; Ruse, 2005).

At present there has been little or no attempt to standardize the cartographies used in public science, leaving the general impression that the evolution-creation controversy exists as a morass of competing cartographies, each promoted and advocated for by different individuals, groups, and organizations. Historically, no matter how prestigious or authoritative the cartography created by groups of scientists or scientific organizations, they have had little to no lasting effect on cartographies made just a few years later, by individual evolutionists or by other large bodies of scientists (Futuyma et al., 1998; Jean & Lu, 2018). Institutional authority, either on the AEC side or the evolutionist side has little impact on the cartographies utilized either historically or presently (Jean & Lu, 2018; Numbers, 2006). Additionally, no attempts have been made to reign in the evolutionists who use different versions of evolutionism to attack religious worldviews. However, the need to do so was recently established in a published study titled “Responding to Richard: Celebrity and (mis)representation of science” (Johnson et al., 2016), where 48 of 137 scientists interviewed in Britain on the role of celebrity scientists discussed Richard Dawkins, without prompting; the majority took the position that “Dawkins misrepresents science and scientists reject his approach to public engagement” (ibid.: 1). These observations by so many within the scientific community demonstrate just how effective public scientists like Dawkins are at spreading their own particular cartographies which incorporate evolutionism (Johnson et al., 2016; Scheitle & Ecklund, 2015).

Thus far the scientific community has ignored the excessive and unsupportable claims regularly made by evolutionary biologists while simultaneously continuing to either dismiss or deny that they occur, or even can occur (Futuyma et al., 1998). At present only one group of evolutionary biologists have sought to regulate public science through the establishment of “a National Committee on Evolutionary Biology” which was conceived as “an electronically linked virtual committee designed as a rapid response network to provide a conduit for input and assistance from the scientific community into federal agencies, the news media, and other entities requiring information from the

scientific community” (Futuyma et al., 1998: 53). This suggestion, however, appears to have been ignored.

4.2 Bourdieu’s Fields, Capitals, and Habitus

Additionally, another theoretical framework is needed in order to understand the structuring among the regional and local AEC groups and organizations. Understanding the social structuring of these groups and organizations is essential to answering questions such as: what is the relationship between national organizations, churches, and AEC groups which exist within the churches? Are they all dogmatically connected, sharing the same cartography? Additionally, what is the connection between different AEC groups and organizations? Are they able to engage in collaboration with one another if they share similar cartographies? Does not sharing similar cartographies prevent their collaboration? And what social factors, beyond cartographies, assist or hinder collaboration between them? Lastly, what is the relationship between individual beliefs and the cartographies of the AEC groups and organizations they are a part of? These questions can all be addressed utilizing the theoretical approach of Pierre Bourdieu as it allows for the identification of how social forces exist around, between, and within different groups and organizations; while also providing the means for understanding individual beliefs and understandings to be incorporated into his framework as well.

Pierre Bourdieu created a theoretical framework for analyzing how social spaces operate. “Bourdieu argued for a methodology that would bring together an inter-dependent and co-constructed trio – field, capital and habitus – with none of them primary, dominant or causal,” according to Thomson (2008: 69). The field defines a given social space with defined yet permeable boundaries which separate it from other social spaces around it. The accumulation or loss of capitals is the dynamic by which agents engage in mobility, either up or down, within the field, as well as to accomplish their goals. Lastly, habitus represents the subjective structuring of agents, represented by their tendencies and predispositions, based upon the structure of the fields they find themselves within; fields thereby influence “practices, beliefs, perceptions, feelings and so forth in accordance with its own structure” (Moore, 2008: 51). Together these three

criteria allow for a comprehensive understanding of how a field is structured, how the field effects the interactions of agents within it via accessibility of capitals, and the effects of the field on the agent's habitus, which in turn, acts back upon the field to influence how the field itself is structured.

Fields are recognizable given that what occurs within them is different from the fields around it – though they may overlap with or be embedded within other fields. Moore (2008: 69) notes that, “The social field consist[s] of positions occupied by social agents (people or institutions) and what happens on/in the field is consequently boundaried.” A boundary is identifiable as there are “limits to what can be done, and what can be done is also shaped by the conditions of the field” (ibid.). The agents within a field are in competition with one another for the accumulation of capitals, both economic (i.e. money) and symbolic (i.e. embodied capital such as: knowledge, education, intrinsic understandings of the field, vocabulary utilized in the field, etc.). Capitals are described as “both the process within, and the product of, a field” (ibid.); consequently, the value of and ability to exchange capitals for other capitals is frequently field-dependent.

There are four different categories of capitals identified by Bourdieu which exist within fields. The first is economic capital, which represents the amount of money and assets an agent possesses. This is the only category of capital that exists externally to an individual (Thomson, 2008). The three other categories, cultural, social, and symbolic, are sometimes referred to collectively as “cultural capital” (Thomson, 2008: 71), and other times as “symbolic capital” (Moore, 2008: 103), and are distinct from economic capital because they are embodied by the agents within a field. Cultural capital represents forms of knowledge like particular cultural and aesthetic preferences, language, and ideology. Social capital includes an agent's affiliations and social networks (family, religious, cultural, ethnic). Lastly, symbolic capital is essentially a catch-all category for all the remaining forms of capital which can be exchanged or utilized within a given field. These can include criteria such as awards, certifications, degrees, and experiences (Thomson, 2008), and also includes the capacity to define particular types of capitals and the extent to which they may be valued or undermined.

The three non-economic capitals are linked, and even co-extensive, with an agent's habitus. As one Bourdieu expert explains, "The symbolic forms of capital are associated with the well-formed habitus and in any group, however defined, those with the well-formed habitus are high in cultural capital" (Moore, 2008: 103). One's habitus is their mental structuring in terms of their preferences, tendencies, beliefs, and practices. It derives from one's past and present circumstances in the fields they have been involved in (Maton, 2008). It is not a formal, clearly identified and systematized, unchanging system, but rather "a system of dispositions which generate perceptions, appreciations and practices" (Maton, 2008: 51). Habitus is the subjective component of the objective conditions of different fields which people interact with. They do not perfectly match one another, but instead engage in mutual influence where people's habitus affects how a field is structured, and how a field is structured alters their habitus. One's habitus is "durable in that they last over time, and transposable in being capable of becoming active within a wide variety of theatres of social action" (Maton, 2008: 51).

When studying field, capital, and habitus, a researcher is able to gain an understanding of the different influences upon individual actions within the evolution-creation controversy. Individual practice is not simply the result of one's particular habitus, but rather how one's habitus relates to their present circumstances within particular fields and their accumulation of important capitals within those fields. In other words, "practice results from the relations between one's dispositions (habitus) and one's position in a field (capital), within the current state of play of that social arena (field)" (Maton, 2008: 51). These factors influence how one may be likely to act and their capacities to take advantage of specific situations within a given field. Hence, in public science, the successful acceptance by the public of a cartography is not necessarily dependent upon the cultural capital gained through science education, the symbolic capital of an academic degree, or the social capital of belonging to prestigious organizations within the scientific community; all of which greatly assists one's position and standing within a scientific field. Additionally, the likelihood of someone openly advocating for certain cartographies depends to a great extent on the capitals they have accumulated and their position within a given field. For example, a member of a regional AEC organization which officially promotes a Young Earth Creationist

cartography would be unlikely to openly promote an Old Earth Creationist cartography unless they had amassed many capitals and standing within the organization, if the AEC organization's official cartography was vague, or if they did not have an official cartography.

The evolution-creation controversy public science field is very different from the scientific field and the capitals from the scientific field do not necessarily transfer well to this field. Successful public scientists need the cultural capital necessary to relate information to their audience, to be a good public speaker, and possibly even a good debater (Numbers, 2006). The incredibly successful public scientist and AEC advocate, Harry Rimmer, had no scientific credentials but his debating and public speaking skills, along with the symbolic capital of his own backyard scientific research institute, which was not actually a scientific research institute, provided him with sufficient capitals to become one of the most prominent AEC advocates in the early 20th century (Numbers, 2006). Rimmer's debating opponents, most of whom were credentialed scientists, had symbolic capitals, in the form of scientific credentials, or cultural capitals in the form of technical scientific language, which actually worked against them as they were perceived by their audiences as being elitist (Davis, 1995). While scientific credentials are much more valued in the present evolution-creation controversy field (Numbers, 2006), they are still not necessary to engage in public science debates. The most watched and publicized debate in recent times was the Bill Nye vs Ken Ham debate where neither debater held a science degree or worked in a scientific research position. While Nye has some formal scientific education and a mechanical engineering degree from Cornell University, which is enough for some to label him a scientist, Ham proudly proclaims his lack of scientific credentials (Etchells, 2014; Ham & Hall, 2012).

4.3 The Broad Field of the Evolution-Creation Controversy

The boundaries of fields are determined by the beliefs and logic of practice. A field represents "a human construction with its own set of beliefs...which rationalize the rules of field behavior" (Thomson, 2008: 70). The shared beliefs of the agents who occupy the field allow for regular and ordered patterns of behavior, and therefore predictability. They are also designed to protect the agents who participate in the field by instituting rules and norms which favor those who regularly occupy it. "Bourdieu's

own explications of field often involved four semiautonomous levels: the field of power, the broad field under consideration, the specific field, and social agents in the field as a field in themselves” (Thomson, 2008: 79). The *field of power* represents all fields within a society and influences which positions are hegemonic and counter-hegemonic. For these purposes, the field of power will be the country of Canada. The *broad field* Bourdieu discusses relates to the evolution-creation controversy as a whole, including both evolutionists and AECs, along with their groups and organizations.

This broad field is vague, yet premised upon a protracted conflict between evolutionists and AECs. On the one side, despite their differences all AECs adopt cartographies which exist in contradiction to evolution and occasionally other scientific data and findings (Dixon, 2008; NAS & IM, 2008). More importantly, they are and always have been reacting to changes in how evolution is taught and presented to the public (Numbers, 2006). Therefore their beliefs and logic of practice is inherently tied to evolutionist public scientists and cannot be meaningfully interpreted without keeping in mind the long history of evolutionists promoting their various versions of evolutionism and philosophical materialism in order to attack religious beliefs.

On the other side of the controversy, evolutionists create and utilize cartographies which either appeal to or attack religious worldviews (Futuyma et al., 1998; Miller, 2007). Moreover, this side, for the most part, does not exist in an organized fashion independent of a moral panic. The specific fields and subfields which occasionally form on the evolutionist side of the evolution-creation controversy divide is very unstable and exists, with few exceptions, only in opposition to AEC outreach and activities in certain times and locations (Park, 1997). So while the evolutionist side has recently been organizing again like they did in the early 1980s (Forrest, 2008), it is unlikely that these specific fields and subfields will exist for more than a few years given that such fields have always been dependent upon a moral panic for their existence.

Collectively, the broad field of the evolution-creation controversy and the specific fields within it, are structured with the idea of opposition in mind. All the organizations and groups involved in this broad field have a logic of practice and a set of beliefs which are in opposition to other positions across the perceived evolution/AEC divide. Such is

the logic of this broad field that it is practically impossible to contribute to the controversy without being labeled as either an evolutionist or an AEC (Park, 1997). This almost arbitrary tendency to divide the myriad of different positions within this broad field into either an 'evolutionist' or an 'AEC' position means that this supposed divide is likely not a meaningful one. Instead this tendency is a function of the logic of practice of the broad field itself. For example, the Intelligent Design movement, as discussed earlier, is not necessarily AEC, despite it being consistently labelled as AEC (Miller, 2007; Scott, 2009). It is also common for many AEC positions to accept a lot of evolutionary change (Numbers, 2011). Additionally, the only major organization to attempt to take a middle-ground in the evolution-creation controversy was the American Scientific Affiliation which, in 1986, published a booklet accepting evolution and taking a Theistic Evolution stance. This attempt received heavy critique and was frequently claimed to be a new version of AEC by critics (Park, 1997).

Consequently, there are several major instances where different social movements and organizations have been categorized as being on one side of the evolution-creation divide or the other, but these categorizations are disputed and often not meaningful (Park, 1997). In addition, the divide seeming to distinguish between evolutionists and AECs is vague and continuously shifting over time (Numbers, 2006). As such, identifying one side or the other in the evolution-creation controversy as a broad field can confuse an analysis more than it clarifies as the divide itself shifts depending upon which specific field it is interpreted from. Intelligent Design advocates do not interpret their movement as AEC (Numbers, 2006), but evolutionists and the scientific community more generally interpret it as AEC (Sager, 2008). Also, the scientific community generally accepts Theistic Evolution as evolutionist (NAS, 1999), but the American Scientific Affiliation's Theistic Evolution position has been categorized as AEC as well (Park, 1997). However, such a clear division between evolutionists and AECs does appear to exist due to how the victor's historical narrative presents a religiously neutral scientific community pitted against a more or less homogenous AEC movement. Such a description, if accurate, would represent two different broad fields with two different types of belief and logic of practice. But the evolution-creation

controversy is much more complicated and ambiguous than the victor's historical narrative suggests.

Additionally, identifying the divide as existing between scientific hegemonic and counter-hegemonic activities is also problematic as the cartographies representing what supposedly is scientific hegemony continuously changes over time and is regularly contradicted by other scientists and scientific organizations as well (Sager, 2008). Even if the scientific community had a stable hegemonic position, recognizing the 'stable' boundary presented by such a position would only represent the scientific communities' interpretation of the broad field of the evolution-creation controversy while ignoring the AEC interpretations.

Generally speaking, however, the present situation is one of entrenched institutional positions as in the example of World War One trench warfare, with a series of both large and small AEC antievolutionist organizations on one side (Abramson, 2017; Numbers, 2006), and a similar grouping of both large and small evolutionist anti-creationist organizations on the other (Forrest, 2008; Sager, 2008); again, with no agreed upon consensus regarding where the trenches are actually located relative to what science is and is not. Despite this, there are standardized forms of engagement between evolutionists and AECs, usually taking the form of debates (Numbers, 2006); such engagements often favor AEC debaters as the evolutionists are often lacking the cultural capital necessary to be a good debater (Davis, 1995; Moore, 1999). This is also not a particularly meaningful form of engagement as it does not involve the two sides coming to terms with one another as the debates are typically an evolutionary worldview vs an AEC worldview.

In addition to these institutionalized and entrenched positions, identifiable by their official statements towards the other side (Sager, 2008; Scott, 2009), there also exist corresponding hostile forms of habitus towards their perceived opponents on both sides of the evolution-creation controversy divide. In the case of AECs, their hostile habitus towards evolution has been obvious since the early 20th century in terms of their writing, lectures, and outreach activities (Numbers, 2006). However, a similar entrenched hostility also exists among evolutionists which is directed towards AECs and is

identifiable given their reactions to those who advocate for reasonable dialogue between AECs and other scientists. Again, the victor's historical narrative, which represents the standard interpretive mechanism for the scientific community, leaves little tolerance for ambiguity and middle-ground positions. A recent article published in *Science* and titled "Misjudged Talk Opens Creationist Rift at Royal Society" (Clery, 2008), describes the events surrounding a lecture on the topic of AEC given by Michael Reiss, then director of education at the Royal Society in the U.K. During this lecture, Reiss discussed how science teachers are bound to encounter students who have adopted AEC worldviews. When this occurs, "he argued, simply dismissing them as not appropriate to a science lesson will only alienate those pupils. Instead, Reiss advocates taking the opportunity to explain the difference between the creationist viewpoint, which, he emphasizes, has no evidence to support it, and evolution, which, he says, has a lot" (Clery, 2008: 1752).

This position has been advocated by increasing numbers of evolutionists who perceive how simply dismissing AECs has done nothing to resolve the evolution-creation controversy (Moore, 1999). Reiss's position likely also derives from his own expertise as both a professor at the University of London's Institute of Education and as an ordained minister of the Church of England, in which capacity he has written extensively on engaging with AECs (Clery, 2008). In this case, many scientist critics, rather than discussing or debating Reiss's informed and expert opinion, condemned him as an AEC sympathizer and ousted him from his position at the Royal Society. Daniel Clery (2008: 1752) describes the aftermath of Reiss's lecture;

Within hours of his 11 September talk, news items appeared on the Internet claiming that Reiss had urged science educators to teach creationism, although many attending the speech said that he had clearly not made such a call. His comments - or perhaps more accurately the spin placed on them by headline writers, newspaper columnists, and editorialists - ignited a firestorm. Several prominent scientists, including a trio of Nobel laureates, called for his resignation. The Royal Society hastily put out a statement defending Reiss but 4 days later issued another statement announcing his resignation and leaving the clear impression he had been forced out.

Each specific country within which the evolution-creation controversy has established itself represents a specific field of power, providing a distinct social setting

of different fields, cultures, history, religions, legal jurisprudence, along with a myriad of other factors (Numbers, 2006). Hence, while the broad field of the evolution-creation controversy has spread globally into many different countries throughout the world, it is also important to recognize that it is also embedded within many different fields of power within those different countries. This radically alters the dynamics at play between the different fields (Numbers, 2006). For example, in the U.S., the broad field of the evolution-creation controversy has been, to a great extent, influenced by legal jurisprudence. From 1924 with the Tennessee Butler Act, to the 1968 *Epperson* court decision, it was legal to outlaw the teaching of evolution. Following *Epperson*, however, AECs could no longer seek to outlaw the teaching of evolution in the U.S. In addition, since the 1987 *Edwards* decision, it has been illegal to teach AEC worldviews in high school science classes (Scott, 2009). However, while these legal decisions effectively prevent AECs from attempting to implement laws against the teaching of evolution or implement policies which allow AEC worldviews to be taught in schools, these occurrences still happen to a large extent anyway but not in an official capacity (Berkman & Plutzer, 2011; Traxler, 1993). These lawsuits also led many AEC organizations to remove explicit references to religious scripture from their cartographies (Scott, 2009).

In the case of other countries outside the U.S. the dynamics of the evolution-creation controversy change dramatically. Whereas in the U.S., the teaching of AEC worldviews is often viewed favorably by those in government (Dawkins, 2015; Numbers, 2006), within Canada the political climate is much more hostile to such worldviews being taught (Barker, 2004). Also, in Canada AECs have had legal setbacks but, for the most part, restricting the teaching of evolution and teaching AEC worldviews in Canada is still legal and regularly occurs (ibid.). In European countries many governments favor AEC worldviews but there are significant legal and political roadblocks to allowing them to be taught in high school classrooms (Curry, 2009). Another country, Turkey, has a population which views AEC worldviews favorably, much more favorably than in the U.S. (Hameed, 2008), and had no significant legal hurdles to outlawing the teaching of evolution. Their specific field of power allowed AECs to recently ban the teaching of evolution in high schools across the country (Gumrukcu, 2017).

Within each country's field of power, there is also a wide-range of *specific fields* within the *broad field* of the evolution-creation controversy. These specific fields, as noted earlier, seem to be divided by the entrenched boundary between AECs and evolutionists. On the evolutionists side there are multiple fields which usually present themselves as a single field. Despite having multiple fields, they usually produce only two different forms of cartographies. As explained earlier, the large groups and organizations of evolutionists tend to produce cartographies which clearly differentiate science from religious beliefs and define the two as not in conflict (Futuyma et al., 1998; NAS & IM, 2008). While at an individual level and occasionally at group and organizational levels, evolutionists systematically produce cartographies which present science and religion as necessarily conflicting with one another (Miller, 2007), often based on the widely held and horribly antiquated White-Draper thesis (Tyson, 2011). However, despite these differences these public scientists still have similar professional goals, to defend the position of scientists within their countries' distinct field of power (Gieryn, 1983), and it is rare for the scientific community to actively condemn or critique other scientists for the cartographies they make. Another systematized product of these specific evolutionist field is how evolutionists regularly make use of the folk devil of AEC and the victor's historical narrative (NAS, 1984; Ruse, 2005).

On the other side of the divide in the *broad field* of the evolution-creation controversy, there also exist many specific AEC fields. Many evolutionists would dispute this claim (Scott, 2009; Zimmerman & Loye, 2011) due to how the folk devil of AEC combined with the victor's historical narrative would suggest that all AECs, along with their groups and organizations exist within a single field; however, for the many reasons already discussed, this is definitely not the case (Numbers, 2006, 2011). In addition, regional and local AEC organizations are often assumed to exist within the same field as the larger AEC organizations as they often utilize the same educational and outreach materials (Scott, 2009). While this is certainly the case when the smaller AEC organizations are chapter organizations of the larger ones, this is not necessarily the case for many, if not most, of the remaining regional and local organizations which are unaffiliated (Abramson, 2017). These unaffiliated regional and local organizations, while frequently combining their efforts with other such organizations to engage in

outreach such as lecture events that this researcher attended in Saskatoon, utilize a multiplicity of educational and other outreach materials which present their readers with a wide-range of contradictory AEC worldviews or cartographies. However, such shared educational materials and cooperation for different events are simply “relationships of exchange between fields” (Thomson, 2008: 70-71) and not constitutive of the same field.

In addition to AEC para-church organizations, there is also evidence to suggest many churches have either officially adopted an AEC worldview (Hill, 2014), or groups of religious followers at different churches have collectively begun to adopt and promote AEC worldviews (Numbers, 2006; Scott, 2009). In the case of the former, if an entire church has officially adopted an AEC worldview, this would constitute a *specific field* (Hill, 2014); in the case of the latter, this would constitute a *subfield* of the larger church *special field* (Scott, 2009). As one Bourdieu scholar explains “each subfield, while following the overall logic of its field, also had its own internal logics, rules and regularities” (Thomson, 2008: 73). This would definitely apply to AEC groups within larger church organizations as they are subject to the rules and regulations of the larger church organization while also occasionally adopting worldviews which are distinct from, or may even also contradict, the official teachings of the churches they belong to (Scott, 2009).

Participation in churches that take antievolutionist stances represents one of the primary indicators determining whether a person adopts an AEC worldview or not (Hill, 2014). Polling based on church denominations is frequently unavailable but what polls there are demonstrate that by 1963, at the beginning of the creationist revival, 30% of Protestants and 28% of Catholics had already adopted antievolutionist worldviews. Broken down by specific denominations, those adopting AEC worldviews ranged from 11% to 94% of particular Christian denominations. In addition, “the scanty evidence available suggests that belief in creationism may have increased by as much as 50 percent during the next couple of decades” (Numbers, 2006: 330). However, despite this strong support within many denominations of Christianity, “in the late 1980s one frustrated fundamentalist noted that ‘not a single Christian denomination or association’ had yet adopted recent special creationism as a cardinal doctrine” (ibid.: 345).

Consequently, even though some Christian denominations have large support for AEC worldviews, these tendencies are often not revealed in their official church doctrines. Instead, these issues are largely decided unofficially among the clergy and the church membership. In other words, the formal cartographies promoted by church denominations are almost never AEC worldviews, but unofficially they may be (Hill, 2014).

4.4 The Relationship between Cartographies, Fields, Capitals, and Habitus

Large AEC organizations, which are national or international in size, each represent a *specific field*, usually accompanied by a shared cartography which provides them with stability. Previous large AEC organizations, such as the Religion and Science Association which did not promote adherence to a particular cartography, were in actuality several fields with different groups advocating for different cartographies. This led to a wide range of contradictory expectations among members of this organization and caused its quick dissolution within only a few years (Numbers, 2006). However, once these large AEC organizations began to adopt statements of faith, or coherent and definitive cartographies, the problem of having multiple fields within these organizations was greatly lessened (ibid.). But a shared cartography does not always equate to a shared field, as the dissolution of the worldwide Answers in Genesis organization in 2005 was not due to the promotion of more than one cartography, but instead the operation of two different fields within a single organization; one created by Ken Ham and another by the other organizational leader Dr. Carl Wieland (ibid.). It is also possible for large AEC organizations to exist in a stable manner without only adopting a single cartography (Scott, 2009).

The single large AEC organization which has multiple cartographies but which represents a single field is the Discovery Institute (Numbers, 2006; Scott, 2009). Some evolutionists have attempted to identify the entire Intelligent Design movement as a single field (Forrest, 2008), but such a claim misrepresents the diversity of the different individuals, groups, and organizations involved with it (Evolution News, 2017). Unlike most historical examples of large AEC organizations which have allowed multiple cartographies, the Discovery Institute avoids infighting by promoting a minimalist and

vague field which is acceptable to many different AECs. “Proponents of ID...seek to maintain a big tent in which all antievolutionists are welcome” (Scott & Branch, 2003: 283). In addition the boundaries of the field of the Discovery Institute is much more permeable than those in other large Young Earth Creationist organizations. As Eugenie C. Scott and Glenn Branch (2003: 283) explain,

Usually any antievolutionist is clasped to the ID bosom. The embrace is not necessarily mutual; traditional young-Earth creationist organizations such as AiG and the Institute for Creation Research regard ID as useful in the narrow fight against evolution but not in the broader fight to win souls for Jesus.

Most large AEC organizations are led either by a single person or a small group of elites (Numbers, 2006). These organizations are often started after the success of certain publications, usually books (representing forms of cultural capital), whereby certain people obtain a large following (that may be drawn upon as forms of social and symbolic capital). The financial and symbolic success of these publications, coupled with their following, brings them into contact with other similarly successful people (social capital) who then use their combined capitals to raise money (economic and social capitals) to begin an AEC organization. Most of the elites in these organizations hold advanced academic degrees (cultural and symbolic capital) and use these to validate their scientific counter-hegemony. It also frequently leads these organizations to appreciate and encourage those with scientific credentials to join their organizations (Numbers, 2006). There are exceptions, as in the aforementioned case of Ken Ham who has no academic credentials, but instead is a highly charismatic public speaker with a strong knowledge of biblical scripture (cultural capital) (Ham & Hall, 2012). Due to the obvious lack of research being done on regional and local AEC organizations, they are frequently assumed to exist and operate in a similar manner to these larger AEC organizations.

Lastly, in terms of habitus, the present literature tends to assume that AECs’ worldviews match those of the cartographies promoted by AEC organizations (Scott, 2009). There is, however, growing evidence against such an assumption. As Jonathan Hill discovered, only 8% of the U.S. population dogmatically believe in a Young Earth Creationist worldview (Hill, 2014). Even Ham has discussed how he does not think that those who profess to hold to AEC worldviews actually believe in many of the aspects of

a Young Earth Creationist worldview. He has also conducted statistical studies which have shown that those Christians who profess to have adopted a literal interpretation of the Bible, the hallmark of an AEC worldview, regularly do not interpret the entire Bible in this manner (Ham & Hall, 2012). Consequently, even those AECs who have accepted the statements of faith in AEC organizations likely have not dogmatically adopted such worldviews. In other words, the habitus of AECs likely do not perfectly match the cartographies which their groups or organizations promote.

4.5 Bourdieu's Three Steps to Research with Field Theory

In order to utilize his field theory in sociological research, Bourdieu suggested three steps to understand fields and the agents within them. The first step is to “analyze the positions of the field vis-à-vis the field of power” (Thomson, 2008: 75). This was addressed in the first few chapters which clearly identified evolutionists as having a hegemonic position and AECs as having a counter-hegemonic position. The second step is to “map out the objective structures of relations between the positions occupied by the social agents or institutions who compete for the legitimate forms of specific authority of which this field is a site” (ibid.). This mapping requires the identification of the fields, agents, and institutions within the evolution-creation controversy, which have been identified above. Also it required the identification and refutation of the folk devil of AEC and the victor's historical narrative in order to clearly determine how the differing fields of AEC activity operate.

The last step in Bourdieu's suggestions for how to research with field theory is to gain an in-depth analysis of the habitus of the social agents involved. Specifically Bourdieu suggests to “analyze the habitus of social agents, the different systems of dispositions they have acquired by internalizing a determinate type of social and economic condition, and which find in a definite trajectory within the field...a more or less favorable opportunity to become actualized” (Thomson, 2008: 75). In other words, by analyzing the beliefs, goals, tendencies, and dispositions of the social actors involved within the small-scale AEC groups and organizations in Saskatoon and the surrounding areas, one can come to understand which trajectories will be taken by such

groups and organizations based upon the opportunities presently available which will allow them to act upon their beliefs and goals.

Chapter 5: Methods

The goal of this research is to engage in an exploratory study of the regional and local AEC groups and organizations both in and around the city of Saskatoon, Saskatchewan, Canada. This researcher was unable to find any other research studies conducted on regional or local AEC organizations and groups, which is likely due to the common dismissal of such organizations and groups within the evolution-creation controversy literature as being mere chapter organizations, or simply smaller versions of the much larger national and international AEC organizations (Scott, 2009). This lack of information, coupled with the unwillingness of many AEC organizations and groups to engage in conversation with this researcher, or even to admit that they promoted or taught AEC worldviews, led to the adoption of a very careful, time-consuming, and ultimately not very efficient recruitment strategy for recruiting informants. Due to time and funding constraints, the sample of AEC groups and organizations was limited to only those in the vicinity of Saskatoon, Saskatchewan. While the previous chapters have assisted in dispelling many of the myths, narratives, and a prominent folk devil within the available academic literature on the evolution-creation controversy, the purpose of these interviews was to gain a more holistic understanding of the specific fields, subfields, capitals, and habitus of the AECs in these smaller AEC groups and organizations. This exploratory research is necessary as these AEC groupings are often incorporated into the folk devil of AEC and summarily dismissed as merely smaller versions of the larger, and much better studied, AEC organizations (Scott, 2009).

Again, the research questions are:

- 1) Under what circumstances did these regional and local organizations and groups form? Specifically, what social fields, social structuring, and concerns led to their development?
- 2) Are there similarities among regional and local organizational and group fields? Are they structured similarly? Do the capitals present within one field transfer to another field easily?

- 3) Do these AECs around Saskatoon base their objections to evolution on purely literalist interpretations of scripture or are these people actively attempting to understand science and evolution?
- 4) Does the individual habitus of AECs match the AEC field which they belong to?
- 5) What are the perceived goals or endgames which these AECs wish to accomplish through their outreach and activities? How do these relate to a possible means of resolving the evolution-creation controversy?

In order to address these questions, detailed descriptions regarding these individuals, their lives, education, beliefs, and involvement in AEC education and outreach were required. Additionally, detailed information regarding their regional and local AEC groups and organizations, the founding of their groups and organizations, their history, group dynamics, and collaboration, or lack thereof, were also required. Ethical approval was required and obtained for this study. The anonymity of the informants was of paramount importance, which is why the informants were volunteers who contacted the researcher to express an interest in participating. This sampling procedure enabled informants to remain anonymous from their peers, and to be interviewed individually in locations of their choosing.

In order to find AECs to interview in and around Saskatoon this researcher had to find places where AECs might congregate. AEC lectures which were well-advertised were attended, which seem to regularly occur once every year or two on average around Saskatoon; although smaller lectures and lecture-tours which are not well advertised happen much more frequently. Services at many conservative denomination churches were also attended. Occasionally the discussion during the service might reveal whether the church had officially adopted or supported an AEC worldview. If this did not work, the researcher would speak with reverends or other church leaders afterwards and discuss whether their church supported AEC worldviews in their services, community outreach, or the educational materials provided at their church. Given the taboo of being an AEC within Canadian culture (Barker, 2004), it was unsurprising that reverends, ministers, and priests were often very reluctant to admit they supported AEC worldviews, even when they did. Moreover, the more liberal (ones

which accept more scientific data and conclusions) forms of AEC worldviews, such as Old-Earth Creationism, are much more difficult to find as they are rarer and do not tend to create dedicated AEC organizations or educational materials (Numbers, 2006; Scott, 2009). Therefore, this research focused on the most popular, visible, and recognizable forms of AEC worldviews: Young-Earth Creationism, Intelligent Design, and, more generally, those which teach or promote Creation Science.

After establishing a list of five different churches in Saskatoon which either officially supported AEC worldviews or had groups of AECs within it who did, head reverends and other church leaders were utilized as gatekeepers to get into contact with the AECs within their church membership. Again, the taboo of being or supporting AEC worldviews within Canada became a problem as many leaders simply refused to reply to requests to speak with or to present information to them, some mentioned their fear that the researcher would overgeneralize their church membership to imply they were all AECs when only a few actually held to such beliefs. For those who did reply back, the research was either discussed with them one-on-one, or they were given a presentation of the research to any interested people, answering any questions and concerns which arose. If any were interested in participating or assisting with assembling a snowball sample of AECs, they were provided with copies of an outline of the research and ethics forms with instructions for anyone interested to e-mail or phone the researcher.

Those who did contact this researcher to be interviewed were either organizational leaders or long-time members of these organizations and groups. This recruitment strategy, where gatekeepers spread awareness of this study and recommended certain people participate led to a particular set of informants who were all very confident, extremely knowledgeable of the evolution-creation controversy and their organizational/group activities and history, and who, with a single exception, had post-secondary credentials in the sciences. The informant ages ranged from mid-30s to mid-70s, and, with a single exception, all were males.

The interviews themselves took the form of semi-structured interviews. The interview was made into a discussion whenever possible as less information tended to

be received the more highly structured the interview was. The informants were encouraged to feel free to discuss whatever issues they felt were relevant to the question at hand. This technique led to the collection of highly detailed data on the structuring of AEC fields, the capitals involved, and the participant's habitus. Some interviews were as short as an hour while others lasted for over two-and-a-half hours depending upon how the participant answered questions, the two-way discussion which took place, and the amount of time which the participant had to dedicate to the interview. The interviews took place wherever and whenever the informant preferred. Most took place in the informant's house but several also took place in churches.

After several months of searching for more potential churches which support AEC worldviews and awaiting potential informants to contact me, six people were eventually interviewed. At this point expansion of the ethical mandate was submitted and approved to interview AECs from para-church organizations and theological colleges as well. Again, however, the taboo of supporting AEC worldviews became apparent. After meeting with several members of such para-church organizations and theological colleges, only a few were willing to be interviewed. Altogether a total of nine interviews were conducted between September 2014 and August 2015. Two of the informants were not themselves AECs but were in positions which allowed them to observe and understand the AECs within their given fields, thereby providing insight regarding how AEC fields have been created, maintained, and how the capitals and habitus within these fields operate.

All informants interviewed had expansive knowledge of special fields within AEC para-church organizations, key positions in church organizations, and/or significant positions within an AEC subfield within a larger church organization. The interviews also made it possible to gain insights into how AEC worldviews operate within some theological colleges. Several AECs advocated for Young Earth Creationist worldviews, while others advocated for an Intelligent Design worldview. Together these types of fields and subfields represent the collective dynamics of how the AEC fields can operate at the regional and local levels within Canada. Lastly, several informants were able to provide insight as to how regional and local AEC fields intersect with one another and

how they relate to the much larger fields found within large AEC organizations in Canada.

The relationship between the informants and the researcher was mutually beneficial whenever possible. The researcher offered to present the finished research to the informants once it was completed and to send them a copy of the completed thesis if they so requested. The researcher also provided information and insight into the issues discussed during the interviews, turning them into more of a conversation with both give-and-take aspects. The researcher would often provide personal information in return or when asked if the informant did so as well. Consequently, discussions concerning early religious and science experiences and research into the evolution-creation controversy were frequently undertaken in a back-and-forth manner. Additionally, while the researcher did not take a position in the evolution-creation controversy, some informants assessed the researcher's level of knowledge as being very limited, occasionally expressing surprise that the researcher had not read a myriad of books which seek to convince their readers of the merits of a particular AEC worldview. These informants appeared to have difficulty with the researcher's position as a sociologist studying the social structuring of the evolution-creation controversy, rather than an individual taking a definite position within the controversy itself.

Chapter 6: Analysis

This chapter presents the main themes which emerged from the interviews with the nine informants. Seven of the informants are actively involved in an AEC group or organization which seeks to teach and promote the AEC worldviews of either Young Earth Creationism, Intelligent Design, or Creation Science more generally. The remaining two informants have not personally adopted AEC worldviews, but because both belong to an organization which actively teaches AEC worldviews they were able to provide insight into these organizations. One of these two remaining informants also teaches students about AEC worldviews and discusses their arguments while neither promoting nor encouraging the student's adoption of them.

The information from the interviews made it possible for me to detail the structures of AEC groups and organizational fields and capitals, as well as their history and activities, in the manner outlined in this chapter. Wherever possible, information presented here about the groups and organizations has been derived from multiple interviews; each group and organization discussed was described in detail by at least one informant who has belonged to the group or organization either from its establishment or from nearly that time and who has had enough involvement and positions within them to be a recognizable authority on how they function and operate.

6.1 The Fields

The specific fields and the subfield discussed in this research are those which exist within the broad field of the evolution-creation controversy. Again, it is important to remember that the Canadian theatre of the evolution-creation controversy exists within the Canadian field of power, which requires a holistic reinterpretation from the standard history which predominantly focuses on AECs within the United States. The broad field of the Canadian evolution-creation controversy has its own unique history and differing power dynamics with the fields of Canadian legal jurisprudence, education, politics, the mainstream media, and anti-AEC groups and organizations (Barker, 2004; Numbers, 2006). These have served to create and perpetuate certain antievolutionist and anti-

creationist traditions, cultures, and narratives within the Canadian context (Barker, 2004). Furthermore, this research was limited to AECs who belonged to AEC groups, churches, or para-church organizations which either exist or operate around Saskatoon, Saskatchewan.

Those interviewed for this research, while frequently describing the same Canadian field of power as being overtly hostile to AEC worldviews and arguments, also described a multiplicity of differing specific fields and subfields existing within a plurality of organizational contexts. Several specific AEC fields are completely distinct from any specific church or denominational fields. These were the para-church AEC organizations which usually operate mainly within a single province though they sometimes engage in outreach or to cooperate with other regional or local AEC organizations and groups within neighbouring provinces. Next there was a specific church field which is adopted and maintained by the majority of the members and ministry of a given church. In other words, the church itself became a specific AEC field. Lastly, one of the AEC subfields exists within a larger specific church field. In this case, several members of a church had collaborated to discuss and present an AEC worldview to other members of their church, their community, and even local religious colleges. However, their church organization has not officially or unofficially adopted or promoted their AEC worldview; their specific church field is distinct from, yet also influences and structures, their AEC subfield.

The information obtained regarding how these fields operate, their scope, composition, history, and influence were all obtained from the informants, many of whom either held or continue to hold leadership positions and have been members of these groups or organizations for almost their entire existence. All the groups and organizations representing a specific AEC field or subfield, and all the informants have been designated with a random designation so as to maintain the anonymity of both the group and organization in question as well as to protect the anonymity of the informant. Due to the limited number of informants, the names and detailed descriptions of the groups and organizations in question might compromise their anonymity, so only general information about each group is provided in the analysis.

6.2 Two Autonomous Fields

Two regional organizations which support Young Earth Creationist worldviews within and around Saskatchewan and Alberta each represent autonomous specific AEC fields within the Canadian field of power. Both are defined in terms of specific territories, claiming to represent Young Earth Creationist advocacy within a single Canadian province, while also coordinating and cooperating with other AEC groups and organizations both within and outside of their home province. These two provincial organizations are designated as organization Bravo and organization Charlie. Both have existed since the early to mid-1970s, both are registered in either Alberta or Saskatchewan as non-profit organizations, and both operate in a democratic fashion where an elected board makes most of the decisions, but regular general meetings are also held once a year in both organizations where board members are elected, representatives assigned, and major decisions are voted on. Due to their size, all the positions within both organizations are volunteer positions, with neither having any paid positions. In addition, both organizations have been heavily influenced by the changing field of power within Canadian society, where the media, politicians, educational institutions, and the scientific community have, with increasing frequency, rejected and condemned AEC worldviews.

Of the two para-church organizations, organization Bravo provides the most obvious example of how the influence and activities of these organizations have diminished over time due to the changing field of power within Canadian society. Organization Bravo was established in the early 1970s and was initially very influential within their province's education field due to many of their initial members also being highly situated within the education field as well. As interviewee D stated, "Our association began...when some school teachers became concerned about the changes...in the provincial curriculum." It was even the case that organization Bravo's first president was also the president of a provincial teachers' association at the same time. This first president "knew everybody" and "could talk to everybody at that time" (Interviewee D). This highly influential president, coupled with a membership comprised

of so many educators and teachers, meant that organization Bravo “had an ‘in’ to all the teachers’ conventions and everything like that” (ibid.).

This interrelationship between organization Bravo’s AEC field and the educational field within the province in which it is situated allowed for a useful translation of cultural capital from one field to the other, thereby allowing for a rapid expansion of its activities into the educational field. In addition, the dominant perspectives within the field of power in Canada were not generally hostile to AEC worldviews and arguments in the 1970s and ‘80s. As interviewee C, who has been involved with AEC outreach, talks and lectures since the 1970s, explained,

Early in the ‘80s and ‘90s this [AEC] was a very open topic compared to now. I wouldn’t say totally open by any means....They’ll [the media] do things with Creation Science but the innuendo immediately undermines it. Whereas in that time there was very much openness...my feeling is that things began to change significantly probably mid- to late-‘90s. In terms of scorn as opposed to curiosity about Creation Science. I’d say in terms of the media and academia. Public schools are a little bit lagging behind that but more and more there’s less openness on that.

This timeline is mirrored by interviewee D’s retelling of the history of organization Bravo. However, rather than attributing the decoupling of, and reduced support for, organization Bravo to a growing anti-Creationist sentiment within the Canadian field of power, other factors, notably disinterest, migration, and urbanization, were instead identified as the main reasons for these developments within the field. Interviewee D commented that, “As time went on and the province became a lot more urbanized, and people who may be coming into the province, not so much interested in Christian background or anything like that. The department of education became a lot less sympathetic.” Interviewee D’s timeline of events shows that it was in the early 1980s where this decoupling took place. “After that I think our acceptability to the public system was considerably less but we did rent a booth space for a number of teachers’ conventions in the early years and we had a number of teachers coming and buying our resources for classroom use” (ibid.). This bridge between organization Bravo and the public educational field in its province appeared to be almost completely severed in 1992 when “one person manning our booth at that time, he said he was practically

afraid for his life...Nowadays, we confine our attention more to the Christian community.” (ibid.).

Consequently, over time there is a continual lessening of transferable capital from the AEC para-church field to both the educational field and to other church fields. This situation, coupled with increasing amounts of division among Christian organizations as well as many other AEC organizations, eventually resulted in a much more selective and narrow approach for the organization. Whereas initially the AEC organizations were much more involved in schools, educational events, lecture tours, and summer camps, now “we don’t organize because nowadays, churches are very resistant to having anybody [speak to their congregation] except their own sort of people” (Interviewee D). In addition, “we’re not...getting into the classrooms nowadays, it’s not realistic, but in the library, that’s not asking too much, I don’t think” (ibid.). Organization Bravo still advertises on Christian radio, sponsors and organizes lectures on AEC, and they publish a widely distributed newsletter (ibid.). However, their newsletter readership has been steadily shrinking,

So in the past [their newsletter] went to all schools of any kind in Western Canada, plus churches. Well, a lot have taken themselves off the mailing list. There are still some schools, I’d say in Saskatchewan, we have quite a list of public and separate schools (Interviewee D).

Organization Charlie, on the other hand, never had all the connections within their membership which organization Bravo had, so the changes within the Canadian field of power have not radically altered its transferable capital to the same extent. Nevertheless, those same changes have still increased the existing roadblocks regarding the transference of capitals between organization Charlie and other fields such as education. At present they mainly collaborate with other AEC para-church organizations to distribute AEC materials such as books and DVDs at book tables at a variety of events. In the past the organization had its own journal publication and a summer camp but these failed to gather a significant following. At present it mainly distributes materials at lectures which it or other AEC organizations organize, at a wide variety of conferences, and occasional sermons which its members present at different churches (Interviewee A). Where organization Bravo had its connections to multiple other fields, especially the education field, curbed by changes in the Canadian field of

power, organization Charlie instead seems content with the status quo. As one representative put it, “it’s the ambition factor of our board. I mean, some of these things are good ideas that have come up...it’s just getting somebody to actually organize it and do it is the issue” (Interviewee A).

Both organizations wish to collaborate with other organizations in order to assist people with obtaining the AEC materials and support they require. It is commonplace for regional and local AEC organizations and groups to work with one another. They purchase and distribute materials to one another, lend one another books and movies, assist with the distribution of pamphlets and journals, advertise for each other’s organizations and events, and distribute materials from the larger AEC organizations (Interviewee A; Interviewee D). One typical example involves the distribution of an AEC journal;

We don’t have anything like that, we did try that at one point so they [organization Bravo] mail theirs into the province. People in Saskatchewan, you know, they want to receive it, and then they mail it in, and again we reimburse for the mailing costs and with other things like that. So there is, you know, some sort of participation between the groups (Interviewee A).

Despite this collaboration, the fields between these para-church organizations remain quite distinct from one another, despite how evolutionists often depict them as having a single or unified focus (Zimmerman & Loye, 2011). There are many interesting reasons as to why collaboration, and possibly even merger, with other AEC organizations does not occur. Obstacles to collaboration can range from such mundane reasons as one organization not having certain tax privileges to, albeit very rarely, supporting dogmatic positions that the organization does not agree with (Interviewee D). Regarding the building of an AEC museum, the tax status of one organization became a large obstacle which eventually prevented two AEC organizations from collaborating with one another;

We were asked to provide a display on plants and we did agree. I wrote an interpretation for plant fossils and we did purchase some plant fossils. But they did not have income tax privileges and we cannot donate to anybody who does not, so we said, ‘well, we’ll lend you the display but it’s our property,’ and they said, ‘no thanks.’ Just at the last minute. So in the end, we took back our fossils (Interviewee D).

Surprisingly, divisions between AEC para-church organizations within Canada never seem to have anything to do with dogmatic disagreements. The divisions instead seem to be largely based on the transferability of capitals. In other words, it hardly, if ever, appears that these regional organizations restrict the promotion of materials based on dogmatic positions taken by the authors; instead, it is the authors or their organizations which prevent the promotion of certain materials. One such example involved a book, *The Cell's Design*, about which an informant stated: "I really like the book" but its author "does promote *Reasons to Believe* with Hugh Ross. If it didn't do that, we would handle the book. But because we don't want to promote Hugh Ross and his *Reasons to Believe*, and he certainly doesn't want any kind of connection with us" (Interviewee D).

Refusing to limit their materials and collaborations based upon specific dogmatic views enables these regional organizations, such as organizations Bravo and Charlie, to promote AEC worldviews and arguments which often do contradict their own. Organizations Bravo and Charlie have officially adopted and promote Young Earth Creationist perspectives which generally contradict the worldview of the flagship Intelligent Design organization, the Discovery Institute. While a dogmatic clash has been well-documented between the Discovery Institute and other large AEC organizations (Numbers, 2006, 2011), such a tension does not seem to exist among regional AEC organizations. "The thing is, the information that the Intelligent Design people produce is welcome and useful, no matter what age you assign to the age of the Earth...anyway, as I said, we couldn't do without the Intelligent Design information" (Interviewee D). Another representative of a regional AEC para-church organization explained,

when we gather information, we don't actually play favorites. I mean, we're the only organization I know of that we go to AiG, we go to CMI, we go to ICR, you know, to Creation Truth Foundation...So we try, we collect good information from just about any source, you know, credible source" (Interviewee A).

[We have] an agreement with the B.C. group, they bring in a lot of Illustria Media [the Discovery Institute's publisher], a lot of DVDs, they bring in quite a few of them so we, you know, give them out. They're not for resale, but we put them on our free resource table...I mean, we recognize that the ID movement, it's good as far as it goes (Interviewee A).

This utilization of information from many difference sources, some of which may come from people and organizations which promote different worldviews, appears to be a strictly one-way phenomenon for these regional AEC organizations and is not reciprocated by larger international AEC organizations. These larger organizations tend to belittle and snub the regional AEC organizations and prefer not to work with them. According to Interviewee D, these larger AEC organizations want the regional AEC organizations to either merge with them or disappear. “Richard Fangrad [the CEO of CMI-Canada] actually wrote a letter that said he was surprised that the local organizations didn’t dissolve when CMI appeared on the scene” (Interviewee D). As one long-time representative of a regional AEC organization explained, the differences between these organizations is often not dogmatic and collaboration is hindered simply due to the desire of larger organizations for control and the desire of regional organizations for autonomy. He explains,

I don’t think that our [organizational] beliefs are much different than CMI...But we did like to have more local control. We did want to be able to use other resources. I guess if we were officially a part of CMI, maybe we would [need to limit our resources]. CMI is a blessing to the world though because they are so effective at educating (Interviewee C).

Other informants were much more confrontational in their interpretations of their treatment by larger AEC organizations:

Back when [our organization] first formed there was a group in Ontario...they actually offered, or it’s not the right word, suggested if you will that we become a provincial chapter of their organization...it didn’t sit right. We think we can do more as a separate, I mean, if we were to become a chapter of something like AiG, then we actually couldn’t promote CMI’s material, or ICRs...Creation Ministries International, when they bring in speakers to the province, they usually don’t let us know...if we were to become a chapter of CMI or whatever, then we couldn’t be as effective in the broad spectrum of Creation Ministries in general (Interviewee A).

They’re [CMI] the big organization, you know, it’s their responsibility to promote creationism in Canada. And I don’t know if they have a whole lot of respect for the small provincial organizations. I mean, again I don’t know for sure but that’s the impression I get from them and what not. I mean, they’re nice guys...but it’s just they don’t...I don’t know, they don’t want to work with us very much on anything (Interviewee A).

They have this control, they’re control freaks...we all have our own inventories, but we get our resources from a broad spectrum of sources. Whereas, of

course, CMI they have their books, AiG has their books, and they don't want to promote anybody else's stuff. AiG actually, I don't know if you're aware that they sent letters from lawyers to all the Creation Science museums; organizations like Big Valley that have Creation Science museum in the name, and AiG said 'you can't use that term, we've got proprietary use of it. And if you keep using that name, we'll sue.' Now some of these organizations predate AiG but that doesn't matter, they see, they want to control the message (Interviewee D).

I really don't understand why organizations like CMI come in...they say they want to bring in information, fair enough, but they know we're providing it here and we've been here far longer than they have been around. So why did they come into our turf without informing us, collaborating, whatever. AiG brings more a lip-service of possibly collaborating but we're suspicious of them too (Interviewee D).

In some ways, these regional AEC organizations perceive themselves as protecting the overall AEC movement from becoming overly dogmatic, excessively limited in its scope, and elitist. As one informant discussed, "the thing is if there's just one control they can go off the rails quite easily. Whereas if there are different organizations wanting to emphasize one thing or another, people are free to make up their own mind. Critically evaluate what's there, so that our organization does not handle all creationist resources" (Interviewee D). Other informants (A and C) also noted how their autonomy allows them to utilize and promote a wider range of materials and screen them as they see fit.

Organizations Bravo and Charlie are both surprisingly liberal in comparison to the much larger AEC organizations such as AiG and CMI. The statement of faith on the AiG website has 29 statements which people must agree to in order to hold positions within that organization (AiG, 2015); the CMI statement of faith on its website has 26 statements which people must agree to for the same reasons (CMI, 2017). Neither organization Bravo nor Charlie fit within the standard model of how AEC organizations have developed since the 1960s. Whereas most AEC para-church organizations have created clearly defined cartographies in the form of faith statements, which serve to effectively limit their membership to those who share particular AEC worldview(s), these two organizations both have vague faith statements; and one has no mandatory AEC faith statement at all.

Organization Bravo has a four statement long faith statement which is not posted on its official website. Interviewer D indicated that, “We expect people to support that the Bible is the Word of God, Christ is our substitute and savior, that there was a world-wide flood, and Young Earth I can guess...four positions.” The specifics of when the creation event occurred, or the dynamics of how the creation event impacted upon the universe, are much more open to speculation within these groups. “As long as they have this basic position pertaining to the basic gospel, Bible message then the details that they fill in, we don’t worry about” (ibid.). In the case of organization Charlie, there is a four point statement of purpose which must be adhered to by all members of the organization. Interestingly, none of these statements is explicitly representative of an AEC worldview. They also have a creation model which is explicitly Young Earth Creationist but which does not need to be accepted by the membership in order to join. As one long-time member explained,

Well I was an Old Earth Creationist for most of my stint with [this organization] so they’re pretty flexible...From what I know about the people in the group, the whole sense of it is ‘okay, if you have somebody who is dissenting from the party-line but has A, B, and C concerning why they dissent but their heart, the group can see that they are genuinely seeking truth and wanting to, and not just a rabble-rouser, they would be welcome. It’s pretty open that way (Interviewee C).

Whereas within previous AEC organizations such ambiguous frameworks led to excessive infighting and eventually the dissolution of the organization (Numbers, 2006), these regional organizations do not seem to have such difficulties. Experts and board members in these organizations are amazingly accepting of views differing from their own. With respect to questions about any disputes among members it was common to receive responses such as: “never had to go there” (Interviewee A); “members, if somebody wants to join and can sign the application we don’t turn them away” (Interviewee D); “if somebody was in there and, you know, wanted to subvert the organization and change its direction and was always causing trouble, they would have to be asked to leave. It’s never happened” (Interviewee C). This acceptance of differing viewpoints and beliefs is especially emphasized by one organizational expert who stated,

even the board members that have a scientific background like myself...We don't really, we probably all have personal opinions of where we draw that line but where we differ, it's not a big deal. I mean it's not a conflict of any kind (Interviewee A).

These regional para-church organizations clearly function in a very different manner than the larger AEC organizations which are usually taken to be the exemplars of the AEC organizations in the evolution-creation controversy. As can clearly be seen, they are much less dogmatically constrained, more territorial, assertive of their autonomy, willing to collaborate with others, and lastly, unlike the larger AEC organizations which are rapidly expanding both nationally and internationally (Numbers, 2006), these regional AEC organizations seem to be declining both in terms of their influence and with respect to their outreach activities. That being said, they are still very active within their respective regions and they still engage in many outreach activities, both individually and collaboratively.

6.3 The AEC Church Specific Field

Several of the informants belonged to a church, designated organization Echo, which had unofficially adopted a Young Earth Creation worldview shortly after it was founded. Within a decade after its founding, the ministers and the congregation had adopted a Young Earth Creation field which has been maintained to the present (Interviewee I). However, as noted earlier, Canada has developed a hostile field of power where AEC worldviews and arguments are considered taboo and are actively ridiculed within Canadian politics, education, and the media (Barker, 2004). This situation has prevented organization Echo from adopting an official Young Earth Creation position, and a changing membership, coupled with more sources of information such as education, the internet, and social media has led to a continuous lessening of financial and other supports for AEC movements in general within this organization (ibid.). At present the specific Young Earth Creation field still holds hegemonic authority over the entire organization, but this authority is continuously being challenged.

Organization Echo was founded in the mid-1980s and began adopting a Young Earth Creation approach during church services and congregational interactions in the

early 1990s. This had little to do with denominational dogma. As one long-time member and expert stated, “I’d say that most [of our denominational] churches, they’re not YECs. You know, they’re much more open, especially if you go to Saskatchewan...if you go anywhere else, they don’t hold stances like this...ours is definitely the most conservative denomination in our church. Even our church knows that” (Interviewee I). Many churches of this denomination exist both within and around Saskatoon, and while most have not adopted an AEC position, a few have. Perhaps surprisingly, given that most evolutionists assume increasing levels of education lessens the adoption of AEC worldviews (Futuyma et al., 1998); in this instance the adoption of an AEC worldview seems to also have little to do with the economic class of the congregation. Interviewee I explains,

[Another church of the same denomination which supports YEC outreach] they’re more blue collar. Ironically enough, our church is a white collar, professional, and I wouldn’t expect to see that because, you know, you go by profession and by wage, you know, you associate economic status...I find it’s interesting because we have a lot of university educated people in our church, we’re a white collar church, and yet we have these YEC beliefs, you know...I would expect it, maybe I’m being biased about it, more people who aren’t as educated might not look into these things, or just accept what they are told and stuff but I suppose that it’s the same thing with educated people. Educated people sometimes just accept what they’re told. People just want to be reassured about what they believe and they don’t want to be challenged, they want to see this narrow window and that’s what they want to hear. And that’s not just in a church, it’s at university too, it can be, or it can be among the educated or among the non-religious. We just oftentimes want to hear what we want to hear, we just want it reinforced. And so I think that’s what happens in our church (Interviewee I).

Interestingly, despite being formed as a conservative branch of their denomination, organization Echo was not founded with a specific Young Earth Creation field. When asked how such a field developed, specifically whether it was due to the views of the pastor or the members of the congregation, Interviewee I explained,

I think a little of both...our original pastor went to a Bible school...[which was] purely fundamentalist and that’s the promotion that they would have. And so he gathered a lot of people, he started our church because people knew him from the past and they came there and they knew his stance and so it was like-minded people coming to a pastor that had these same views. And so that’s how it started, and that’s why we have such a predominance of that view in our church.

At present there exists a Young Earth Creationist hegemony within organization Echo and there are few who are in positions of authority who explicitly dissent to a Young Earth Creationist worldview and outreach activities. “Generally in our church the YEC is the strong view among the ones that have a say in our church,” according to Interviewee I. It is also the case where the present ministers still hold to the Young Earth Creation field and it is, at present, not acceptable to question its existence. The former and present head ministers have all supported and maintained this specific field in this organization. As such, members and visitors do not have the ability to question these ideas;

if it strays out of the orthodoxy, you have to be careful what you say. But as long as you avoid these topics [Young Earth Creation worldview and arguments], then you’re okay. So I think that’s what most people do, avoid the issues. And then you don’t get into trouble. When you get into discussing some of these issues, it can become pretty heated so people have just learned to stay away from them (Interviewee I).

Despite this hegemony, in recent years there have been radical shifts within this organization where Young Earth Creation positions are discussed and supported less and less. Interviewee I indicates that, “Five to ten years ago we used to have regular sessions on [YEC], on creation science, like week-long, speakers coming in and this stuff...We actually used to put dollars into some of these week-long events, like ten years ago, but since then we haven’t.” As another long-time member explained,

In services in the past...[the pastor] flat out came out one morning and said ‘I’ll come out and say it, Genesis is true, six days.’ He carried on in the context of the service...in the time that I’ve been here, there’s not really been many, just pastors or whatever, guys speaking on Genesis or Biblical creation, or scientific evidences or whatever. Usually it’s been especially invited speakers or something (Interviewee B).

So despite having a strong hegemony within this organization, the actual support for AEC worldviews, both in terms of services focusing on this topic, or by supporting AEC speakers, has been waning over time. “[Our church] traditionally, actually, has been one of the churches in the city that has accepted creationist speakers in and so it’s something that they have been trying to continue,” according to Interviewee B. However, these attempts have been hampered by “[the head pastor’s] concern, whether it was over members, the board, I’m not sure, were not wanting to step on toes. They

weren't wanting the speaker to be kind of dogmatic and saying, you know, 'if you don't believe in a literal six days and a young Earth and whatever, you know, you can't be a Christian and stuff'" (ibid.). Other experts describe a push-back against AEC ideas. Interviewee I states that, "I think there's a lot of people in our church that are saying, 'hey, it's a little too much in that area.' They're not going for it as much, so you do see a softening." While AEC speakers are occasionally still allowed to use Organization Echo's church, the overall support from the organization has been dwindling. Such speakers are required to use the church facilities in the evening, with minimal advertising, and attendance is strictly voluntary.

Organization Echo's library is also filled with AEC books but there recently have been attempts made by some members to balance this situation. This is largely a product of the organization's long-time support for AEC outreach. Interviewee B observes that, "I think creation science often, if they have a tour they'll donate a copy of a couple of books or something. The church is where the guys are at, so it's still there after they leave, you'll still have access to it." In response to this situation, an attempt at balance has begun;

Even our librarian...she's a soft creationist I would call her, even she says 'ah, you've got too much on this, we should have some balanced views on this.' So she brought one book in, we have one book in our library that actually, from a Christian standpoint, that looks at it from a different perspective. One book out of hundreds of counter-books, but even she, and other people in our church are saying 'hey!' You know, I think there's a bit of a backlash in our church against this whole YEC thing (Interviewee I).

This slow transition from a strong Young Earth Creation organization which was known for actively supporting AEC outreach, to a more benign or neutral organization is often attributed to two different sources: increasing access to information available through education, the internet, and social media, and an increasing hostility from the previously mentioned arenas of Canadian mass media, politics, and education. Part of this transition is due to access to information, in a context in which "you live in a community that everyone says the same thing that you believe and say...you don't think much about it, but you get one person that stands up and says 'hey, I don't believe that,' and that's a shock to the system...the whole internet, cross-cultural connection, the fact

that more of our younger people are getting educated and stuff, bringing in different views...that closed community, isolated community, isn't there anymore" (Interviewee I).

Interestingly, this transition appears to be led less by anti-AEC voices than by AECs themselves. The incredibly hostile responses characteristic of the general field of power within Canada creates an environment within which the promotion of AEC fields can effectively isolate organizations from the community around it. This situation has forced AECs to question the usefulness of an AEC orientation within the context of their organizational goals and institutional dogmas. This has led to an odd situation where it is actually the Young Earth Creation proponents who are scaling back support for their own worldview;

interesting enough, it's the senior pastors and some of the leaders in the church [who are behind this shift]...our pastors have said 'you know, we shouldn't be pushing this that hard, you know, because that's not...if we want to interact with the community, we can't be known to be this...that's a peripheral issue and you guys can go and discuss it over there if you want but that's not orthodox. That's not the key elements of what we're trying to get out.' So it's coming from our senior pastors who are moving us away from that thinking, even though they, themselves, are YECers (Interviewee I).

Organization Echo, being a church, first and foremost, has been more radically affected by Canada's increasingly public hostility towards the creationist positions. Although the majority of congregation members and ministers seem to support their present Young Earth Creation approach which appears to still hold hegemonic authority over the organization, overall support for AEC discussions and outreach have lessened greatly. In an effort to prevent isolating themselves from the community around them, and thereby hindering their organizational purpose, church leaders have begun increasingly to roll-back overt support for AEC worldviews, despite their personal belief in such views.

6.4 Fields within Fields

Several of the informants were also members of a small group of people who promote Intelligent Design. Their membership and activities are, for the most part, limited to a single Pentecostal church. As such, this AEC group exists as an AEC subfield, within a specific church group henceforth referred to as organization Delta.

This is the youngest AEC group or organization discussed here, as it began to exist within the last decade. This AEC group is enabled by organization Delta to engage in AEC outreach activities due to the present composition of its specific church and its members. However, organization Delta neither supports nor rejects the AEC subfield promoted by this small group. Organization Delta exists within the broad framework of the Pentecostal Assemblies of Canada (PAOC), which provides an extremely interesting background for the dynamics of this group to engage in AEC outreach.

It is interesting simply to situate this particular AEC group subfield by locating it within the larger fields surrounding it. To start, we must again mention that the Canadian field of power is overtly hostile to AEC beliefs and outreach (Barker, 2004; Gerson, 2015). This environment appears to effectively prevent any organization, other than para-church AEC organizations, from officially declaring themselves as AEC. As we saw with the last AEC church organization, organization Echo, despite having an AEC hegemony within their organization, these members have begun to downplay and minimize their AEC positions and outreach to avoid division and conflicts with the wider society around them (Interviewee I). Similarly, the parent organization for organization Delta, the PAOC, also has a clear AEC hegemony but not a clear or official AEC stance. As one member of organization Delta, who has also been an AEC advocate for decades, explained,

Young Earth Creation, I know of a number of pastors who are...leaning in that direction strongly I think. But it's basically a quiet topic, probably because of the controversy that's around it and probably because...of the public ridicule that's so possible when you move in that direction (Interviewee C).

The PAOC represents a broad field which governs and unites all Pentecostal churches within Canada. A recent poll of the beliefs of PAOC credential holders, those who possess symbolic capital specific to the PAOC, found evidence of a distinct AEC hegemony within this broad field. 80% of PAOC credential holders agree or strongly agree that the "evolution of humans from a lower form of life is incompatible with the Scriptural account of creation" (Stewart & Gabriel, 2014: 10). Additionally, the majority of the membership of the PAOC was also shown to be predominantly Young Earth Creationist in its orientation as 54% of credential holders agreed or strongly agreed that "God created the world in six, 24-hour days" (ibid.). However, despite this massive

support and AEC hegemony, the PAOC has not officially adopted a distinctly AEC faith statement. Under the subheading of Scriptures within the PAOC's Statement of Fundamental and Essential Truths there are dogmatic assertions which are often linked with AEC beliefs. These include statements that, "The whole Bible in the original is...without error and, as such, is infallible, absolutely supreme and sufficient in authority in all matters of faith and practice" (PAOC, 2014). Such claims to Biblical inerrancy or infallibility, while not necessarily promoting AEC claims, are often associated with them. As Dixon (2008: 88) explains,

Many creationists have based their stance on a literal interpretation of scripture. Those religious traditions that place a strong emphasis on textual authority, notably some varieties of Protestantism and Islam, are therefore more inclined towards strict creationism.

Additionally, this broad AEC representation within the PAOC has been identified as such by many long-time members of a Pentecostal church. Every single informant who attended organization Delta explained how Young Earth Creation appears to be "the go-to understanding of Pentecostals" (Interviewee E); "I don't think that there's anything in their doctrinal statement that says that it's a young Earth. I think what they do promote is creationism...Pentecostal churches tend to be the last ones giving up the young Earth ideas" (Interviewee G); "the denominations that are more inclined [to be YEC] would be Pentecostals to a degree" (Interviewee C). When asked specifically if Young Earth Creation is the default position of Pentecostalism two experts replied, "Yep, I would say yes" (Interviewee F); and "I think that would be a fair conclusion; I can't say historically with absolute certainty but I think so because we've tended to just sort of take the Bible at face value in, at least the classical Pentecostal movement" (Interviewee H).

Consequently, both the interview data and the statistical data provide strong evidence that organization Delta adopts a broad AEC orientation that is recognizable as such by both credentialed and non-credentialed members alike. Given that the PAOC has an obvious AEC hegemony, and that the majority of its members are Young Earth Creationists, one might expect the AEC group within organization Delta to be somehow connected or influenced by the PAOC. This connection, however, does not appear to exist. There is a large disconnect between the worldview of the PAOC and the small

AEC group; this is the specific characteristic of organization Delta. Organization Delta does not support or promote a specific AEC position. In fact, it would appear as though the specific church stance of organization Delta is neutral on these issues. One member explained how “the sermons don’t address the topic” (Interviewee C). Several long-time members even expressed concern that organization Delta does not address how science and religion relate at all, stating: “I think the beliefs of my church...I’m a little concerned because they don’t think science is relevant in a lot of ways” (Interviewee E); “the head pastor, our other pastors wouldn’t come to see [our presentations and discussions] because they have the view that ‘oh, if we touch that subject, it will be divisive in the church’” (Interviewee G). Therefore, this AEC group’s subfield is situated within both a broad AEC field and a specific non-AEC church field. Additionally, while the broad AEC field of the PAOC promotes Young Earth Creation, the AEC subfield promotes Intelligent Design.

This attempt by those in positions of authority within organization Delta to create a specific approach which is inclusive and avoids the divisiveness of the evolution-creation controversy has both enabled the AEC subfield to exist, while also, as discussed above, providing no significant attempt to promote it from the church. As one long-time member put it, “I feel bad that the church is not more open to the whole area of God as the creator...No one in the church has that much interest in science and the Bible” (Interviewee G). Prior to the development of this AEC group several years ago, there was no visible AEC outreach within organization Delta at all. As one long-time member and expert on the organization explained,

There was none of that. There was an assumption that what we believed was YEC, but as far as I know...we’ve never hosted any seminars on YEC as other churches have and a Christian school continues to do. There was an openness to the introduction of it; it wasn’t seen as an attack on anything...so the YECs in our congregation were very supportive of it (Interviewee F).

This expert, interviewee F, also recognizes the assumption of a Young Earth Creation field in Pentecostalism, but also recognizes the uniqueness of organization Delta within a Pentecostal context. While the assumption of a Young Earth Creation worldview is still present, it is not preached or substantiated in church teachings. Additionally, the supposed incompatibility between Young Earth Creationists and

Intelligent Design advocates, found among larger AEC organizations (Numbers, 2006), is not present either. One expert went so far as to say, “you were looking for Pentecostalism, or the popular view of what Pentecostalism is, you come into one of our church services on Sunday morning, you’d think, ‘this cannot be a Pentecostal church.’ There is an openness and there is an accepting...it’s a very balanced church” (Interviewee F). Organization Delta is so open and accepting that it even encourages its members to meet and discuss ideas with people of other religions;

One of the classes that we offer is the Bridges Outreach to Muslims where we learn about Muslim beliefs and where we encourage our people to reach out, to be friendly with Muslims...and in the basis of friendship and relationship, we can honestly talk with one another where you know that I’m not trying to convince you, and you’re not trying to convince me, but we look at what is the truth actually (Interviewee F).

It is within this context that this AEC group is allowed to promote and encourage discussion on Intelligent Design and the arguments the movement presents. At present, “Intelligent Design is being taught at the church...it’s just been introduced through a series of videos and panel discussions” (Interviewee E). These panel discussions were inclusive to a wide-range of positions, from Theistic Evolution to Young Earth Creation, and all were welcome to share their views and debate their positions and arguments. As one Young Earth Creationist explained, “I loved it. It was excellent, and I liked the idea that the whole spectrum was out there, that whole transition that I went through” (Interviewee C). Another respondent (Interviewee F) commented that, “We were expecting the opposition to come from the YECs, most of it came from the Theistic Evolutionists who would stand up and say to me...‘I’m born-again, I believe in everything you believe in except this.’ So we had some very animated, we were friendly, some very animated discussions over many of these topics.”

Despite this openness, the difficulties in spreading their outreach have been hindered by what seem to be inaccurate assumptions rather than dogmatic interpretations. The only outreach discussed by members of this AEC group was their movie/panel discussions and an attempt to introduce Intelligent Design into a theology college. It was this outreach directed towards the theology college, henceforth referred

to as organization Alfa, which serves to emphasize the importance and influence of perceived differences between fields, capitals, and the habitus of other agents.

From the AEC group's perspective, this attempted outreach was a complete failure. The consensus view from the AEC group members is that their outreach attempts were blocked by the fundamentalist adherence to organization Alfa's adherence to the PAOC's broad Young Earth Creation field. "There was a show of concern because the assumption would be that Pentecostalism would adhere to a strict literal Young Earth, six literal 24-hour days, so anything that would in any way water that down was a problem for a least one of the profs," according to Interviewee F. Another member explained "they don't want to have these videos presented at the college. We've struggled for several years, it wasn't very successful" (Interviewee G).

However, a representative from organization Alfa described an entirely different perception of these attempts at AEC outreach. Organization Alfa shares a very similar approach to these issues as the AEC group. Their theology courses introduce students to a wide array of different positions and they consciously attempt to provide students with knowledge of a wide array of positions taken to integrate science and religion. Theological stances as diverse as Young Earth Creation, Progressive Creation, Theistic Evolution, and Intelligent Design are all discussed and no single position is emphasized. "The main point that I'm trying to get the students to realize as we go through, we go through Creation Science and Progressive Creationism, Theistic Evolution, and I talk a little about Intelligent Design, and say kind of where does that fit in here? And I just want them to realize there's different ways and they're evangelical who believe in Jesus and love God with all their heart and so forth that think differently about this," according to Interviewee H. When asked about any Young Earth Creation hegemony at organization Alfa, Interviewee H stated "I have not sensed any explicit pressures. I would say that the administration here is more than happy with the way that I teach about creation and its relationship with science."

Given this situation, the AEC group and organization Alfa should have been able to collaborate successfully in AEC outreach. Both engage in AEC outreach by creating social platforms and classroom conditions whereby many different AEC positions are

discussed and debated. Additionally, organization Alfa was already teaching and discussing Intelligent Design in its courses. In the end, it was a lack of capital transferability from one organization to the other which prevented the two from working together. The lack of social and cultural capital between the two fields, represented by false assumptions about their intentions and the goals of their outreach (a lack of social and cultural capitals), led to mutual distrust among the two groups. The AEC group members assumed that they were introducing new ideas to organization Alfa, and this same lack of capitals led people in organization Alfa to think that AEC group members were very dogmatic in their positions. Interviewee H observed that, “When the idea was thrown about making it perhaps part of the curriculum I guess part of my thought was that we already expose students to it.” Additionally, the broad Pentecostal Young Earth Creation field gave false impressions across this field divide as well. The AEC group believed that Intelligent Design was dismissed by organization Alfa because it can contradict a Young Earth Creation worldview, and organization Alfa members perceived the AEC group as wanting to push dogmatically a Young Earth Creation worldview onto their students. As neither assumption was remotely the case, this perception was likely taken from the broad Young Earth Creation field common to both of their organizations. As Interviewee H explained,

I was also slightly concerned that they would come in and try to force YEC on students too. I didn’t want to force anything on students. I don’t force anything on the students. There’s students who have finished my...class and they are YEC and others who have changed their minds, or maybe they were Progressive Creationists and now they’re YECs. So I didn’t want them to force something on the students either, so that was another concern I had. But it sounds like they probably wouldn’t have.

This unique situation wherein an AEC group attempted to collaborate with organization Alfa demonstrates the difficulties involved with such a proposed undertaking. Even with a shared broad field with similar beliefs, a liberal engagement of ideas, along with free and open discussion, they were still unable to collaborate effectively. No other interaction demonstrates better the problematic aspects of the folk devil of AEC. Even when it seems like nothing should stand in the way of two AEC groups/organizations working together, there are many instances of them being unable to do so; surprisingly most of these reasons appear to have nothing to do with dogma.

Additionally, both organization Delta and organization Alfa demonstrate how the promotion and teaching of AEC worldviews can be non-aligned with denominational hegemony and, in some cases, contradictory to denominational dogma. Consequently, simplistically blaming AEC beliefs, arguments, and worldviews on religious dogma can be very misleading.

6.5 The Actors: Capitals and Habitus

Of the individual informants, their capitals, and their habitus, there is much information which runs counter to commonly held assumptions about AECs and several instances which even run counter to the general trends found within large-scale survey data (Hill, 2014). It must be acknowledged that this sample of AECs is not representative of the general population of AECs either in or around Saskatoon, as this was a volunteer sample of presumably confident and informed AECs who were willing to be interviewed for this study, keeping in mind that there were many who declined to be interviewed. Nevertheless, this data does provide an exploratory snap-shot of a little-studied and largely unknown population of AECs who regularly are ignored in the presently available evolution-creation controversy literature (Numbers, 2006; Scott, 2009).

Of the nine people interviewed, eight were individuals who actively teach or promote AEC worldviews and arguments to others. Surprisingly, only six individuals interviewed would self-identify as holding to an AEC worldview. One informant, while teaching others a wide variety of AEC worldviews and arguments, also teaches people about evolutionary worldviews, such as Theistic Evolution, and does not seek to impose any of these particular viewpoints on others (Interviewee H). The other, while an active AEC promoter, does not personally reject an evolutionary worldview, discussing the evolution-creation controversy he stated “I don’t have a problem with both sides...I would say that both sides don’t have an adequate explanation and I think that within the record of the Bible and within the Christian faith, there’s many, many things that we don’t understand...but really that’s all accepted by faith and the fact that there’s a creator has to be accepted by faith as well” (Interviewee G). In other words, he does

not believe that AEC worldviews can definitively, at least at the present time, be shown to be better or more accurate than evolutionary worldviews.

Additionally, many of these AECs do not match what has previously been found regarding the churches where AECs are members. According to findings by Hill (2014), one would expect that the majority of AECs would come from or presently belong to churches with clear promotion of AEC worldview(s). However, these informants broke this mold. Of these informants, two are long-time members and leaders of religious organizations which have both historically and presently promoted AEC worldviews, yet they themselves do not reject evolution (Interviewee I & H). Of the eight who teach or promote AEC worldviews, six used to be long-time members of churches which did not actively promote AEC worldviews, and five presently belong to churches which do not officially teach or promote (i.e. during services, in classes, or by supporting AEC para-church organizations) AEC worldviews or arguments.

It was even the case that four of the informants had at one time been long-time members of one church organization that did not in the past or presently promote AEC worldviews. Of those who attended this church, one holds to a Young Earth Creation worldview, one to an AEC Intelligent Design worldview, another to an evolutionary Intelligent Design worldview, and one to a Theistic Evolution worldview. Additionally, three informants who presently attend the same religious organization, which also does not officially promote AEC worldviews, all have differing worldviews. One holds to a Young Earth Creation worldview, another to an AEC Intelligent Design worldview, and a third to an evolutionary Intelligent Design worldview. These trends demonstrate that on an individual level, it is seemingly impossible to predict what worldview people will hold based upon the worldview(s) promoted by an AEC church, organization, or group which people either in the past or presently belong to. While generally this has been shown to be the case (Hill, 2014), individual habitus often is not a microcosm of the fields a person belongs to.

Based upon the interviews, individual worldviews related to AEC appear to derive from early childhood, young adulthood, or through exposure to AEC outreach. Only three informants discussed how their worldviews had changed radically over their

lifetimes, often transitioning from evolutionism to an AEC worldview (C, F & E). Many of the others discussed how their parents had held similar views (A & B) or how their worldviews have been consistent for several decades (D & G).

This group of informants were also highly educated with post-secondary degrees, diplomas, and other certifications in science and science-related fields of study. It was actually rare for these informants to have only a single degree or diploma from a post-secondary institution. Of those interviewed six had multiple university degrees; five had obtained Master's degrees and three had PhDs. With a single exception, all the informants had post-secondary credentials in the form of post-secondary degrees, certifications, and diplomas in science and science-related fields of study. The only exception to this was interviewee H who, while highly educated with three university degrees, admitted that, "I haven't done any real natural science classes since I finished high school."

So all of these informants had large amounts of cultural and symbolic capitals in the form of post-secondary education and credentials as well as middle-class incomes. Of the nine informants, six are retired or are collecting pensions while also working other jobs. The remaining three have successful careers working in different professions. Additionally, all have strong social capitals deriving from strong relationships with friends and family, with all being heavily involved in their churches, several of these in leadership positions.

Six of the informants have adopted AEC worldviews where evolution, as it is presently taught within mainstream science, and their own personal worldviews are in conflict; however, the reasons for this conflicting interpretation vary widely. One AEC views the present evolution-creation controversy as a rebellion against God, stating "it really goes back I think to what happened prior to Darwin, maybe starting with Charles Lyell, but even before that, probably the Enlightenment philosophies, which created a kind of rebellion against theism I believe" (Interviewee C). This historical narrative fits with the pervasive evolutionism which has been maintained alongside evolutionary teachings since Darwin's *Origin* was published (Kemp, 2012; Ruse, 2005), and would partially explain why biologists actively prevented attempts to interpret evolution

theistically so that it could be utilized as a progressive ideology for attacking religious belief (Scott, 2008; Turner, 1978). Surprisingly, of the two informants holding this interpretation of history, one holds to a Young Earth Creation worldview while the other holds to a Theistic Evolution worldview (C & I).

Other AEC informants simply conflated evolution with evolutionism and philosophical materialism, therefore choosing to reject evolution based on these perceived connections. This demonstrates just how successful evolutionist public scientists have been at conflating these positions together. Interviewee F comments that, “The ID approach to me is one that...[challenges] the atheistic position that eliminates God from the equation completely and say ‘look, let’s look at the evidence, let’s look at the things that are happening, and ask ourselves is everything that we see in life the product of a random process, unguided, undirected? Or are there evidences that suggest that can possibly be so?” Another informant explained “the education system tells us that we’re, you know, here by chance and that evolution took place” (Interviewee B). Yet another informant explained “my love for science died at university. Here’s what I mean, when I learned that science had proven that there is no plan or purpose or meaning to this universe...I did not look forward to reading about more scientific discoveries...entertaining Darwinism in my mind as the truth, it squelched my love of science” (Interviewee C).

One informant had a very clear conception of how methodological naturalism ultimately results in philosophical materialism and evolutionism, stating,

The thing is that methodological naturalism presupposes that one will only look for explanations that involve matter and process. So that means that if something was created say, or came about another way, that question isn’t even asked. If a question isn’t even asked, you can’t identify something that is going to answer a question that is not asked...the conclusions one draws, the interpretations depend on the assumptions you are prepared to make. The assumptions you are prepared to make depend on your belief system. So if you have a belief system that God will never be revealed in nature, you are never going to see Him. So that is something that we want to point out to people who think, ‘oh, all scientists believe evolution is a fact, etc.’ They are interpreting what they see in terms of their biased questions (Interviewee D).

Finally, there are those AECs who do not agree with the separation of Christianity and science which occurred in the 19th century (Numbers, 2009). It is these

AECs who conceptualize Christianity and science as being necessarily integrated, and seriously flawed when they are separated, who tend to be Young Earth Creationists. “When I think about science, I think about it as a methodology for making discoveries about the natural world. So obviously it has some limitations there. And the method itself is a philosophical idea that I think you can only ground...well in a Judeo-Christian worldview,” according to Interviewee E. Another explained how “science properly understood agrees with, it confirms the reality of God, of the Bible” (Interviewee A). One informant was very explicit in his beliefs, stating “I guess my faith is based on the Bible, the integrity of the Word, that being the Word of God, inerrant, accurate in the original manuscripts. And if it says that God created in six days, that he spoke the world into existence, we would have to believe that” (Interviewee B).

Additionally, the three informants who do not identify as AECs also perceive many of the same problems with the teaching of evolution, and science more generally. These informants all pointed out that scientists regularly make conclusions which go well beyond what they can demonstrate utilizing the methods of science. Interviewee G observes,

The thing is, they put a framework around ‘what is science’ and I operate within that framework. I do not feel that it is sufficient to explain everything and it does not help me to understand origins. Also, I have studied a lot about evolution and the various blends of evolutionary theory, but I do feel that they are not honest in stating their case. They operate within the confines of the scientific method and the steps of it, they won’t allow you to go outside of it, but they cannot use the scientific method themselves to verify what they believe.

Another of these non-AEC informants makes a similar point, stating, “I tend to think of science as more being descriptive of the material world. And when science starts to, you know, make philosophical claims or theological claims even, for example, the material world is all that there is. Like how can you prove that based off of science right” (Interviewee H)? The third non-AEC also makes a similar point,

I think science, especially in the last three to four hundred years since the Enlightenment, we’re trying to be more naturalistic in their explanations, moving away from the theological explanations of where...why we’re here and what we are doing. But maybe they’re gone too far, you know, said everything is naturalistic and you can explain it right from the atom up, type of thing. Maybe that’s where science is pushed a little too hard” (Interviewee I).

In addition to perceiving problems with scientists regularly making claims which go well beyond the theories and data of evolutionary theory and the natural sciences more generally, all of these informants recognized that those holding Christian beliefs are increasingly coming under attack from scientists and atheists. This is claimed as another large justification for their continued teaching and promotion of AEC worldviews and arguments. One informant summed up the concerns of many AECs by explaining,

so we're losing all these young, they're losing their faith because they've learned the Bible, they've grown up with that, God exists and loves you, but then they get bombarded by this 'oh, it's a fact, it's a fact, it's a fact,' which it isn't, it's not provable, it's not scientific, it's not, you know, you can't reproduce it, you can't observe it, it's not scientific... They need the information in order for them to be able to stand and say 'yeah, the Bible is plausible, it does match up scientifically with the evidence.' It might not be provable but it matches up. Therefore I will maintain my faith and maintain my integrity in the scripture and belief in God, and be able to stand against, you know, the education system, the media. In terms of apologetics I guess that's the sort of thing that we need then (Interviewee B).

In fact, it is their concerns about hostility to Christian beliefs, recognized by all the informants, which is the primary motivator for many of them to engage in promotion and teaching of AEC worldviews and arguments. These attacks, coupled with the rampant evolutionism and philosophical materialism which has been intertwined with teachings on evolution, has left them with seemingly no choice but to reject evolution and occasionally mainstream science as well. One informant has had the opportunity to ask many university students how they feel about the culture at their local university. "We've asked them 'do you have a sense of your faith being challenged or attacked?' ... I think all of them have sensed it and the animosity towards Christians in general, not necessarily in every course but in general it's hostile it seems" (Interviewee H). An AEC describes how, in general, "our culture has left the God-consensus and we're getting increasingly anti-Christian, we're not just tolerant... we're tolerant of everything else it seems except for Christianity. That one it's okay to hate and mock" (Interviewee E).

The AECs in this sample of informants were primarily motivated by the three main points which are roughly outlined above. Firstly, there are the particular Young Earth Creation beliefs concerning Biblical interpretation which then must, in their view, necessarily dictate how science develops and the conclusions it reaches. Second, are

the perceptions of the adoption and spread of scientific ideologies such as philosophical materialism and evolutionism. Lastly, there are the perceived attacks and pressure put upon Christianity within Canadian society which apologetics in the form of rationalizations of science from a Christian perspective might help to curtail.

In addition to these three points, there are also the earlier mentioned symbolic and cultural capitals possessed by the AEC informants in this sample, in the form of multiple degrees, diplomas, and other certifications within scientifically related fields, which explain why these AECs feel confident when questioning scientific data and conclusions. They express these positions through statements such as “there’s some things that creationists can’t explain yet...It’s just as well explained by evolutionists but there are so many other things better explained by, you know, by creation than by evolution” (A). Or how “you can always find good reasons to be critical” (Interviewee C), or “in micro-evolution, I support fully. When it comes into the area of macro-evolution and common descent...I don’t support that, I don’t buy that, I don’t see that” (Interviewee F). By far the most scientifically credentialed AEC promoter explained,

The evolutionist which talks about all the transitional elements, I ask them to show me where they are and I say their case is very weak. So that is the best research topic they could ever latch onto. Prove your evolutionary theory to me using the scientific method, but they can’t do it. Even what they do come up with is transitional elements are very weak (Interviewee G).

The three motivating factors, combined with their scientific education and science related post-secondary certifications (symbolic and cultural capitals), serve to structure the goals of these AECs. Each AEC has an imagined outcome or ‘endgame’ for their AEC promotion and outreach. These involve differing goals which commonly are some combination of four different factors: promoting and justifying a ‘Biblical’ worldview, in order to alter how science is practiced and understood; being critical of and identifying the faults of evolution; empowering Christians to have confidence in their worldview, so that they are able to defend their beliefs in an increasingly hostile environment; and, lastly, to encourage debate between AECs and the scientific community, so that their ideas can be compared and the best can be determined by comparison with scientific evidence. Many of these informants made explicit reference to these factors when explaining the endgame of their AEC outreach:

In introducing the ID discussion into our church and presenting these outreaches, there's really two-fold: one, to show our young people that there's a rational basis for your faith. It can be intellectually defended and supported and promoted. And secondly, to encourage those who have accepted blindly that science has proved that there is no god, period. To at least attempt to raise a reasonable doubt in their minds (Interviewee F).

The endgame for me is that, I think I realize that as my own children became teenagers, they had heard too much in the church about seven days of creation and very little presentation too often within the church. And then they started coming into high school and I say 'hold it there, you're going to run into trouble in your life. You may even give up your faith because you cannot put the pieces together at all because the picture that has been painted for you is very damaging.' So my desire is to give them something that they can live within. There is no conflict between science and God because God is the author of science (Interviewee G).

My endgame is to encourage people in their faith, to show them that belief in God is rational, that if they have an intuition that says 'I think God really does exist and that I should trust him.' I want to encourage that and say 'yes, you're well within your rational rights to do that and you need to own it.' You need to be able to stand and say confidently 'I believe there is a God and here's the reasons why.'...That's my endgame, it is to encourage people in their faith and also to show those who have walked away that they need to check themselves before they wreck themselves (Interviewee E).

I'd say the majority of people in Saskatoon, in the province, recognize the faults, the deficiencies of evolution, and the strengths, just the legitimacy of creation science...that's the ultimate goal...I think there's too many Christians in churches of all denominations that have accepted evolution...They don't connect that with the consistency between that and what the Bible teaches. We would like them to recognize that (Interviewee A).

Several informants also claimed their ultimate endgame with promoting and teaching AEC arguments and worldviews was simply to force free and open discussion to occur within the evolution-creation controversy:

What I would like to see there is open discussion...I would like to see back and forth writing...It's what I'd like to see...Just open, free dialogue by the people who have the science background and the skills to throw out, to clear the clutter, and get closer and closer to the real truth, as opposed to just writing, each side just writing the other one off and talking past each other. That's where I'd like to see it and why? Because the closer we can live in and do our research toward truth, the better off the world will be (Interviewee C).

Absolutely, that has always been an objection of the creation science movement, is that people be free to pursue their science asking whatever questions they like and then...publish in suitable journals, and then let the

stakes fall where they may. As for our association itself, our big objective is that more people qualify, more young people become qualified in science and medicine who are able to have an impact on their chosen professions. Especially in teaching, research, medical ethics, things like that, so that is our objective. We're not seeking to change the world, at least...it would be nice, but you have to be realistic. So I think this is a realistic goal and that's what we would like (Interviewee D).

As these interviews demonstrated, being an AEC does not isolate individuals nor does it seem to limit the capitals they are able to obtain. Outside of a scientific discipline, these worldviews and arguments do not seem to hinder the accumulation of economic, social, symbolic, or cultural capitals one can gain within the wider Canadian field of power; with the single exception being within the field of Canadian politics (Barker, 2004; Gerson, 2015). Additionally, while several informants, especially those holding Young Earth Creation worldviews, have the goals of restructuring how science operates and the theories it utilizes based upon their own biblical interpretations; many do not claim to hold to such goals. The majority of those teaching and promoting AEC worldviews and arguments do so with the goal of empowering Christians to defend their beliefs within an environment which, they believe, is becoming increasingly hostile to religious beliefs, especially Christian ones. Both of these types of goals benefit, in part, with a critical assessment of evolutionary theory and philosophical materialism more generally, as these are often combined together into evolutionism when evolution is discussed and taught (Ruse, 2005).

Chapter 7: Conclusion

The evolution-creation controversy is, at present, an intractable global issue largely due to how it has been engaged with by the national and international AEC organizations, as well as how it has been responded to by the scientific community, evolutionists, and other public scientists. Both these large AEC organizations and evolutionists have created a social 'battlefield', complete with institutionalized 'trenches' for adversaries to attack one another's position/worldview in an organized fashion, and a 'no-man's land' in the middle which is not allowed to be occupied without opposition from both sides. The scientific community generally contributes little to this state of affairs other than by acting as 'artillery' for the evolutionist institutions by periodically rejecting or condemning AEC positions/worldviews. It is this structuring of the controversy which is widely considered to be the reason for the seeming permanence of this controversy (Moore, 1999). Luckily this assessment is becoming increasingly obvious to both AECs and evolutionists alike, as both the available literature and these interviews demonstrated.

While AEC organizations and groups, of all types and sizes, have often created 'echo-rooms' for their own dogmas, and have frequently not engaged sufficiently with the available scientific research (Miller, 2007), the evolutionist side of the controversy has often been guilty of similar problems. The available academic literature is permeated with misinformation and missteps by the scientific community in terms of how they have engaged with the counter-hegemony of AECs. While its hegemony within Canada has enabled the scientific community to successfully create and endorse the folk devil of AEC and a widely adopted victor's historical narrative, utilizing both to great effect in order to create and supposedly 'defeat' a caricature of AECs both historically and presently; this tactic has only allowed for minimal successes in resolving the evolution-creation controversy (Gallup, 2014; Moore, 1999). These tactics both hinder the ability of the scientific community to understand the concerns and arguments of AECs, as well as prevent effective responses to their counter-hegemony. Both

historically and presently the most effective means of alleviating this controversy has been to create social spaces for dialogue and exchange between AECs and scientists so that their ideas and positions can be directly compared and contrasted. Interestingly, when interviewing informants from the regional and local AEC organizations and groups, this is exactly the type of engagement which they desire and try to promote.

Thus far, the folk devil of AEC, along with the victor's historical narrative, has been utilized to great effect to win important court battles and policy disputes within both the U.S. and Canada (Barker, 2004; Numbers, 2006); in the high school science classrooms and among the general populations more generally, however, the results have been much more dubious. The percentages of the Canadian and American populations who hold to an AEC worldview have remained large, and the large national and international AEC organizations continue to grow and open new chapters internationally which has increased their outreach (Numbers, 2006). The present approach by the scientific community appears to have had some success at the level of regional para-church AEC organizations, some of which seem to have had their outreach lessened or restricted within Canadian society. Still, other regional AEC organizations have enjoyed educational policy victories by limiting how evolution is allowed to be taught within Canadian classrooms (Barker, 2004). At the local level the results are difficult to interpret. There are still copious amounts of active local AEC organizations and groups within both Canada and the United States (Abramson, 2017; Northwest Creation Network, 2016). Additionally there are also many church organizations, and smaller AEC groups which teach, support, and advocate for AEC worldviews and arguments, but these are hard to identify as the taboo of being an AEC advocate organization in Canada has led to these organizations only unofficially adopting or supporting AEC worldviews (Numbers, 2006). This taboo has, however, in some instances served to limit the amount of support AEC organizations and groups are provided with by church organizations as well (Interviewee G); thereby hindering their outreach activities and visibility.

Additionally, misinformation spread by prominent public scientists permeates the available literature on the evolution-creation controversy, leading to false conclusions regarding the success of these tactics. For example, the assertions that AEC or

antievolutionism is unique to the U.S., or that Creation Science and Young Earth Creation worldviews have been exchanged for Intelligent Design (Scott, 2009; Zimmerman & Loye, 2011). This extremely distorted image of AEC counter-hegemony both hinders scientists, academics, educators, and concerned citizens from understanding the issues involved, and thus prevents any effective systematic response capable of resolving the actual complaints and issues AECs have with evolutionary instruction and science instruction more generally.

The fundamental break between the scientific community and AECs appears to be with how scientific conclusions and data are interpreted philosophically, rather than the facts, hypotheses, theories, and laws themselves. The scientific community has had a long-standing anti-religious culture which has continued until the present day (Miller, 2007). Even the most prestigious peer-reviewed scientific journals have historically published explicitly anti-religious propaganda (Morse, 1887). However, given the ideological propaganda promoted by large scientific societies and the authoritative amicus briefs endorsed by large segments of the scientific community, the anti-religious culture of the sciences and the pervasive evolutionism and philosophical materialism utilized by public scientists to describe and explain science to the public are almost entirely ignored; science is presented as separate from religion and neutral on religious issues (Futuyma et al., 1998; Klayman et al., 1986; NAS & IM, 2008). As a consequence, one of the primary motivators of AEC counter-hegemony, the perceived need to enable religious, especially Christian, individuals to defend their beliefs from the onslaught of so many within the public science community (Miller, 2007), is also systematically ignored by the scientific community as well.

Consequently, all the blame for the evolution-creation controversy appears to reside only with AECs themselves and no blame whatsoever is shouldered by the scientific community. The AECs are thereby described as being either scientifically illiterate or overly dogmatic (Miller, 2007; Numbers, 2006; Scott, 2009). While it is certainly the case that some AECs reject evolution for strictly doctrinal reasons (Interviewees A & B; Numbers, 2006), nationally representative surveys have shown that only a minority of AECs adopt the doctrinal worldview of Young Earth Creationists (Hill, 2014). This is important because one of the findings of these interviews was that

only the Young Earth Creationists wish to alter how science is both done and taught in order to bring it more into alignment with their own particular doctrinal interpretation of Christianity. The other AECs and Theistic Evolutionists are reacting to the long-standing and systematic attempt by many within the scientific community to teach evolutionism rather than strictly evolution, which is regularly used by public scientists to attack religious beliefs (Miller, 2007). Again, many researchers have shown that there are many more issues involved with the public's acceptance of science,

An individual's knowledge of science rarely shapes attitudes toward support for science (Bauer et al., 2007). Instead, affective factors, such as whether science communicators are perceived as sharing one's values (Kahan et al., 2011), views about science in society (Brossard and Nisbet, 2007), or whether communicators are seen as fair (McComas and Besley, 2011), heavily shape public perceptions of science (Johnson et al., 2016).

Even discussions about the distinction between evolution and interpretations of it through the lenses of evolutionism or philosophical materialism are rare in the evolution-creation controversy literature. The attempts to merge evolution and evolutionism have actually been so successful that only two informants (D & G) brought up the issue that it is not accepted scientific data and evidence, but how it is interpreted, which is problematic. All the other AEC informants in this study perceived evolution and evolutionism as being one and the same. This is a significant finding considering the large number of scientific and science-related post-secondary certifications these informants happened to have. The majority of AEC informants perceived either evolution, in its entirety, or macro-evolution to be erroneous due to its incompatibility with Christianity and theism more generally. As this is not a necessary conclusion based upon evolutionary findings (Miller, 2007; Plantinga, 2009; Scott, 2009), instead this connection is likely derived from the systematic efforts of evolutionists to portray them in this way (Graffin & Olson, 2010; Miller, 2007).

The folk devil of AEC depicts all AECs as overly dogmatic, unwilling to alter their views, and all sharing the same views. This often can appear to be the case in larger national and international AEC organizations which require adherence to elaborate faith statements representing particular cartographies, but among smaller regional and local AEC organizations and groups, there is no need to maintain such adherence to faith

statements. These smaller AEC organizations and groups do not require adherence to elaborate cartographies, and many do not require adherence to any faith statements. Many of these smaller AECs pride themselves on utilizing a wide variety of materials from many different perspectives and openly investigating, discussing, and debating the merits of each. They have members who possess many different AEC worldviews. Informants demonstrated how many of these people change their worldviews over time depending on the evidence and arguments they encounter. Perhaps most contradictory to the folk devil of AEC are the experiences of two informants (G & H) who teach and promote AEC worldviews and arguments but are not themselves AECs. In both these cases, along with several other AECs (F & E), their primary goal was to enable Christians to defend their faith in the face of atheistic attacks which often take the form of public science claims which are also made by famous public scientists (Miller, 2007); they were much less concerned with which particular AEC worldview was adopted by those they taught and promoted AEC worldviews to.

There are, however, many difficulties encountered when these regional and local AEC organizations and groups attempt to collaborate with one another. Although these smaller organizations are often dismissed as followers of larger AEC organizations (Scott, 2009), the information provided by the informants demonstrated that this definitively was not the case. These smaller AEC organizations and groups appear to have no specific loyalty, affiliation, or even a definitive cartography to go along with their AEC teachings, funding, and outreach. Additionally, they encounter many difficulties beyond simple dogmatic concerns when attempting to collaborate on different projects or to work together. The problems which occur when attempting to collaborate with other groups and organizations can be summed up as the 'non-transferability of capitals from one field to another.' The inability for some AECs to successfully take their social, cultural, symbolic, and economic capital from one AEC field to another is essentially the main limitation preventing larger and smaller AEC organizations and groups from either collaborating closely or even merging with each other.

While these smaller AEC organizations and groups do not allow dogmatic differences to limit their collection of educational resources, membership, and discussions to the same extent as with larger AEC organizations, they are still limited by

other organizational concerns such as organizational autonomy, territoriality, tax privileges, and fear of other organizations and groups seeking to impose limitations upon their own member's beliefs or outreach activities. It is this organizational dynamic which thoroughly refutes the existence of a folk devil of AEC, as even when dogmatic differences are not an issue, there are still plenty of pragmatic and organizational reasons as to why different organizations and groups cannot successfully collaborate with one another.

The interviews also demonstrated just how difficult it can be to identify which churches systematically promote AEC worldviews, and how Young Earth Creation ideological hegemony within a broad field, such as the PAOC, does not necessarily mean that AEC activity within the underlying specific field(s) or subfield(s) will take the same, or even a similar form. The overt hostility to AEC beliefs and outreach activities within the Canadian field of power does seem to have a significant effect upon the AEC teachings, promotion, and outreach within church organizations which have adopted AEC specific fields. The overall effect has been to encourage these churches to hide the outward appearance of such AEC activities, making them more difficult to identify. This has the added effect of churches lessening or refusing to fund, promote, fundraise, or otherwise assist AEC groups and organizations.

In the case of the PAOC, in which over half of the assembly credential holders are Young Earth Creationists and the vast majority are AECs, there was an incredible variety of worldviews at the individual level among these informants who belonged to this denomination, varying from Young Earth Creation to Theistic Evolution. Additionally, from the larger broad field, to the specific field, to the subfield the transitions varied widely, forming their own approaches to issues of how science and religion intersect. This makes the Canadian Pentecostals an excellent example to illustrate how religious dogma does not operate in any straightforward manner to produce the adoption of varying AEC worldviews, thereby making other variables such as perceived threats to their beliefs, as well as the promotion of evolutionism and philosophical materialism, much more relevant to understanding why AEC worldviews are adopted.

More generally, this research clearly demonstrates the problems with utilizing negative labels in order to identify any particular grouping of people within a society, especially one which could very well number over half the population of the U.S. and around a quarter of the population of Canada. Whereas evolutionism-creationism debates tend to be framed as opposition between tightly organized homogeneous groups, my findings highlight that these AECs hold to a myriad of different worldviews, and the objections to the teaching and promotion of evolution, as well as other scientific theories, are extremely diverse and often based in the perceived incompatibility of these theories with the values, traditions, and beliefs of religious individuals, groups, and organizations. The very adoption of the term 'creationist' to label all these counter-hegemonic people is an ethnocentric scientific position which seeks to problematize all other positions except for the scientific position as well as scientific teachings and outreach activities. This perspective, which permeates almost all the academic research and literature on this topic, is one which must be questioned and critiqued in order to actually address many of the root causes of the evolution-creation conflict which have been discussed at length in this research. The framing of a social issue will determine what aspects of it are problematized and therefore what types of solutions are sought.

Perhaps the most important finding in this research has been the finding that historically the institutional structure which has caused the most liberalization, or adoption of increasing amounts of mainstream scientific findings, of AEC worldviews is creating space for open discussion and debate among differing scientists and AECs. Traditionally the poor performances of evolutionists within such institutional spaces, such as public debates, has caused them to shy away from such engagement (Moore, 1999; Numbers, 2006). This has led to a noticeable lack of engagement between the scientific community and AECs, eventually leading to the present situation of entrenched institutionalized warfare where both sides have developed specific institutions which exist solely to promote their own worldviews and challenge their opponent's worldviews. These 'echo rooms' are not designed for, nor are they conducive to engaging in an open and respectful manner with those who hold opposing worldviews and arguments.

This institutional structuring is potentially the greatest hindrance for resolving the evolution-creation controversy. The development of such public spaces for open and respectful engagement appears to be the most fruitful approach possible given the views of these informants. Several have repeatedly altered their worldviews over time (Interviewee C & E), and several others have expressed their willingness to change their views depending upon the arguments and evidence they encounter (Interviewee F, G, & E). Additionally, several have explicitly stated that the envisioned endgame for their AEC advocacy and promotion is to have such an institutionalized engagement between AECs and scientists on issues related to the evolution-creation controversy (Interviewee C, D & F). Interviewee C summarized this situation well, stating,

What I would like to see there is open discussion. A two-hour debate which is rarer and rarer especially as evolutionists keep losing. It doesn't get at the heart of what I would like to see. I would like to see back and forth writing where the evolution, and actually Stephen Meyer has been able to get engagement from the evolutionists in ways that Creation Scientists haven't, probably because he's seen as not quite as far out so he's written Darwin's Doubt, his latest book...So there is some debate happening and Stephen Meyer keeps responding and it's the kind of engagement, it's the endgame. It's what I'd like to see...Just open, free dialogue by the people who have the science background and the skills to throw out, to clear the clutter, and get closer and closer to the real truth, as opposed to just writing, each side just writing the other one off and talking past each other. That's where I'd like to see it and why? Because the closer we can live in and do our research toward truth, the better off the world will be. It's just going to make for a better world, here and hereafter.

Unfortunately, this type of institutionalized engagement cannot be developed without assistance from the scientific community, which at present largely shuns such attempts at engagement (Clery, 2008). This is largely due to previously discussed unregulated nature of present-day public science, the 'Sagan Effect', and the misperceptions of AECs caused by the prominent folk devil of AEC promoted by so many within the scientific community, as well as the victor's historical narrative which presents the scientific community as continuously defeating AECs and thereby not needing to alter their tactics. The large AEC organizations are not conducive to such engagement as, if they do not function as echo rooms and disallow a plurality of worldviews to take hold, then their organizations tend to fracture and dissolve (Numbers, 2006). The smaller AEC organizations and groups both can and do create

such institutional spaces but they are very small-scale and therefore cannot have a large enough impact to assist in the resolution of the evolution-creation controversy. This means that it is up to the scientific community to abandon its present confrontational institutionalized engagement strategy of creating explicitly anti-AEC groups and organizations, while also engaging in blanket condemnation of all AEC worldviews within larger scientific societies (NAS & IM, 2008; Sager, 2008).

Such institutionalized engagement between the scientific community and AECs would benefit the scientific community immensely, while also working towards resolving AEC counter-hegemony by actually addressing their concerns rather than simply creating and attacking a folk devil of AEC and celebrating an incredibly flawed victor's historical narrative. With this approach scientists could come to understand what AECs actually believe and why they believe it. They could address their arguments, confront their own responsibility for the evolution-creation controversy, and likely manage to liberalize many AECs as well, possibly even convincing them of the validity of an evolutionary worldview. The misinformation present within the available literature on the evolution-creation controversy would be systematically challenged, and the larger AEC organizations would need to engage with these discussions or provide rationales as to why they do not. The discussions would likely lead to the introduction of a plurality of ideas which could undermine the echo room format of these larger AEC organizations as well. Regardless of what the outcome would be, it is hard to argue that free, open, and respectful discussion would somehow negatively affect the present circumstances of the evolution-creation controversy.

More generally, it is becoming increasingly obvious that there needs to be a more adequate understanding that public science does not necessarily represent the scientific community, and if it is to do so then there must be a regulated and accountable public science managed by the scientific community. As the present hegemonic bloc of present-day western societies, the scientific community can no longer afford the massive disconnect between the knowledge and ideas present within the sciences, and the manner in which they are presented to the public by public scientists who hold little to no accountability to the scientific community. The public is more dependent upon public scientists than upon the scientific community to learn about science and what it

means, both for themselves and their worldviews. As public scientists often speak with the authority of the entire scientific community on many different issues, this break and lack of accountability is hardly ever apparent. The consequence being that it is surprisingly difficult to determine what positions the scientific community actually holds to on any given issue, even if recognized scientific bodies have adopted clear positions on a given issue (Jean & Lu, 2018). Essentially, the hegemonic knowledge of the sciences, which present-day western societies must place their trust in, needs to coincide with the representations of such knowledge presented by public scientists; a circumstance which does not match the current situation.

7.1 Research Questions

Given the findings of both the critical analysis of the evolution-creation controversy literature, as well as the interviews conducted, the research questions can now be answered.

- 1) Under what circumstances did these regional and local organizations and groups form? Specifically, what social fields, social structuring, and concerns led to their development?

Within these interviews, information regarding the founding and development of three different AEC organizations and one AEC group were obtained. Two regional para-church organizations, one church organization, and one small group, consisting of four individuals, were studied. The circumstances surrounding the founding of each AEC group or organization shared several similarities, but also many differences. Organizations Bravo and Charlie are both para-church organizations and were formed in the 1970s when groups of like-minded people banded together to challenge the school curriculum changes which were occurring in high school textbooks in the 1960s. In the case of organization Bravo, these individuals happened to be predominantly educators and school officials; with organization Charlie, the individuals were predominantly well-educated laymen with a few educators as well. Both operate in a democratic fashion with elected representatives, who are also volunteers, making the day to day decisions and managing their various programs. Both these organizations are non-denominational and operate in collaboration with various church organizations,

other AEC para-church organizations, school districts, teachers, and laypeople. Over time both these organizations have continuously engaged in fewer outreach activities, often due to the hostility of the wider Canadian field of power. This hostility from the fields of science, academia, politics, the mainstream media, and public education has largely prevented their attempts at outreach into these areas. Additionally, while one organization requires adherence to a minimalist faith statement which describes a vague but definitive Young Earth Creation worldview, the other only requires adherence to a faith statement on general, if conservative, Christian dogmas, none of which require adherence to an AEC worldview or cartography.

Organization Echo, the church organization, was also founded by like-minded individuals who collectively shared AEC interpretations of biblical scripture in the late 1980s. In this case, however, the AEC worldview and outreach have always been a secondary issue; as compared with organizations Bravo and Charlie where AEC worldview(s) and outreach are their primary considerations. After the founding of organization Echo, it took roughly a decade before clear and consistent AEC teachings, promotion, and outreach activities began to occur. Additionally, increasing hostility from the Canadian field of power has now resulted in this organization minimizing its AEC promotion and outreach activities. While the AEC worldview officially promoted by the church is somewhat vague and not clearly spelled out in a cartography, the head ministers and most members maintain a Young Earth Creation hegemony within the church which cannot be openly challenged as yet. This hegemony is maintained by the majority of members as organization Echo functions democratically with elected boards and established mechanisms in place to remove from office anyone who does not have the support of the membership of the church.

In the case of organizations Alfa and Delta, neither of these two appear to have officially or unofficially adopted or promoted a specific AEC cartography. Nevertheless, there are those within their organizations who choose to teach about, and occasionally promote AEC worldviews and arguments. In the case of organization Alfa, this occurs within the context of classroom settings where a multitude of different biblical interpretations take place. The goal in these settings, however, is not the promotion of an AEC worldview or arguments. Instead, the goal is for the students to understand the

multiplicity of ways that Christians can and do interpret scripture and relate it to science more generally.

In the case of organization Delta, it has a small but dedicated AEC group which is neither endorsed nor rejected by the authority's governing organization Delta. Organization Delta is governed by a series of elected and appointed officials who are governed by democratic processes. Consequently, these head ministers and councils are accountable to their membership. As there has never been any AEC worldview adopted or actively promoted by the church, and as such topics are considered divisive and taboo, it is unlikely to do so in the near future. Still organization Delta's specific field is accommodating enough to allow an Intelligent Design group to promote and advocate for the ID movement within their organization.

These AEC organizations and groups demonstrate that it is extremely difficult to predict where and when AEC groups and organizations will form. Factors such as denominational affiliation, church doctrine, AEC hegemony, or whether a church organization is fundamentalist leaning or exceptionally accommodating to many worldviews, appear to all be factors in the establishment and development of AEC organizations and groups. At present, as the evolution-creation controversy literature has shown, there are no particular factors for predicting the development of AEC groups and organizations beyond belonging to a very conservative church organization which promotes scriptural literalism (Dixon, 2008; Hill, 2014). As such conditions exist among over half the American population and almost a quarter of the Canadian population (Angus Reid, 2012), attempts to resolve the evolution-creation controversy would likely be more fruitful if they instead focused on altering how the scientific community and public scientists represent their concepts, findings, facts, hypothesis, laws, and theories to the public. There is no doubt that these AECs are reacting to the scientific presentation and teaching of biological evolution to the public (Numbers, 2006, Scott, 2009) and there appear to be many problematic aspects to this engagement.

- 2) What factors influence AEC organization and group collaboration? Do the capitals present within one field transfer to another field easily?

The research on both the evolution-creation controversy literature and the interviews conducted demonstrate that the folk devil of AEC, along with the victor's historical narrative, together represent an attempt to represent all AECs as working together toward common goals by common means (Scott, 2009; Zimmerman & Loye, 2011). Not only are AEC groups and organizations each distinct in their formation, organizational characteristics, goals, and types of collaboration, but their attempts to engage in outreach collaboration are often hindered or prevented by a myriad of different reasons, many of which have nothing to do with their particular cartographies. The implication that all AECs can or do work together or that they share similar goals is nonsense.

Ironically, despite the frequent use of materials produced by larger national and international AEC organizations' outreach by the smaller regional and local organizations and groups, the larger organizations also tend to treat the smaller organizations and groups with contempt and ridicule. Additionally, larger AEC organizations actively seek to avoid collaboration with regional and local AEC groups and organizations by not informing them when they are having events (Interviewee A). However, among the regional and local AEC organizations and groups, collaboration is commonplace. These collaborations must be carefully negotiated, recognizing that many attempts at collaboration end in failure. Nevertheless, many regional organizations have successfully collaborated with others over many decades. The level of least collaboration appears to occur among the local AEC organizations and groups. For example, organization Echo is continuously lessening its collaboration with other AEC para-church organizations, and the AEC group within organization Delta failed to successfully collaborate with organization Alfa (its only such attempt at collaboration thus far).

The general trends show that the large AEC organizations are the least willing to collaborate with others. The regional AEC para-church organizations appear to be the most willing to collaborate with others, while also tending to actually collaborate the most. Lastly, the local AEC organizations and groups represent a position somewhere in the middle, seemingly less willing or able to collaborate than the regional para-church organizations, but much more willing than the larger AEC organizations. The reasons

for these differences are tied closely with the organizational and group goals. The larger AEC organizations are frequently interpreted as wishing to control the message and dominate AEC discussions and outreach, hence they rarely choose to collaborate with anyone. The para-church organizations seem to want to spread AEC worldviews, their critiques of biological evolution, and discussions concerning them as far as possible. More generally they wish to encourage critical thought and alternative discussions on scientific topics. Consequently, they often make great use of collaboration. Lastly, the local AEC organizations and groups often view AEC promotion, education, and outreach as secondary to other organizational concerns or they represent subfields within these larger organizations who view AEC activities in this way (Interviewees B & C). Additionally, they sometimes lack the cultural, social, and symbolic capitals necessary to understand or make themselves properly understood within different fields; a situation which leads to misunderstandings and false assumptions, such as when organization Delta's AEC group attempted to collaborate with organization Alfa.

- 3) Do these AECs around Saskatoon base their objections to evolution on purely literalist interpretations of scripture or are these people actively attempting to understand science and evolution?

This research into the evolution-creation controversy literature, as well as the presently available research regarding the public and professional understanding of evolution, clearly demonstrate that biological evolution is one of the most confusing subjects in all of the life sciences. This situation is not helped by the confusing and contradictory manner in which public scientists and the scientific community have chosen to present evolution to the public (Jean & Lu, 2018). Despite this these informants have almost all obtained science or science related post-secondary education and have continuously attempted to understand the problems with biological evolution for themselves. As to whether these often differing interpretations are 'legitimate' or should be engaged with by the scientific community is beyond the scope of this research. Still, both the history of the evolution-creation controversy and the goals and aspirations of many of the AECs interviewed suggest that active engagement

with these ideas in a public forum would benefit both AECs and the scientific community to understand the relevant issues involved in the evolution-creation controversy.

As to whether the AECs and those involved with AEC groups and organizations, several of which are non-AECs, hold to a purely literalist interpretation of scripture, this appears to be a minority position. Several of those who have personally adopted an AEC worldview do so strictly based upon their particular interpretation of biblical scripture (A & B), these informants clearly stated at some point during the interview that science must fit within their interpretation of biblical scripture, else it is not correct. Interestingly, both these informants have science and science related post-secondary credentials. Others who also hold to such literalist interpretations of scripture have adopted AEC worldviews also, in part, due to problems with the interpretation of evolution. However, their interpretation of scripture did not seem to be their main or primary rationale for adopting and advocating for an AEC worldview. Issues such as evolutionism, philosophical materialism, and even methodological materialism were raised by these AECs in addition to their scriptural literalism for their advocacy for AEC worldviews and arguments (C, D & E). All three of these informants hold university degrees in science and science related fields.

Finally there were those informants, both AECs and non-AECs, who all belong to organizations or groups which either have an AEC hegemony, or which have people within them who advocate for AEC worldviews (F, G, H, & I). None of these people could be categorized as biblical literalists, all hold multiple university degrees, and all were critical of how biological evolution has been taught and presented to the public by both public scientists and the scientific community more generally. Of these four informants, only two held science or science related degrees; and the only informant among these four who has personally adopted an AEC worldview did not hold a science or science related degree. Additionally, only one of these informants does not teach, promote, or advocate for AEC worldviews and arguments to others.

In summary, five of the nine informants hold Young Earth Creationist worldviews which automatically require a literalist biblical interpretation. However, throughout these interviews only two informants mentioned explicitly that science should be forced to

match their biblical interpretations (A & B). The rest of the AEC informants never claimed this, and several of the Young Earth Creationists had changed their minds regarding what they believe about science, and biological evolution in particular, over time as they have actively sought to understand the issues involved in the evolution-creation controversy (C & E). These interviews suggest that, with the exception of two informants, the remaining five AEC advocates do not base their worldviews upon a strictly literalist interpretation of scripture. Additionally, all of these informants have actively sought over many years to understand the issues involved in the evolution-creation controversy, and therefore all have attempted to understand science and biological evolution as well.

4) Does the individual habitus of AECs match the AEC field which they belong to?

This is a question which does not appear to have been asked within the evolution-creation controversy literature but one which is obviously important for people to communicate effectively and respectfully within the broad field of the evolution-creation controversy, both on the AEC side and across the divide(s) separating AECs from evolutionists. Regarding these informants, there were four examples of people teaching or belonging to organizations who promoted AEC worldviews which they did not necessarily believe in. One instance involved interviewee C, who for most of his membership with an obviously Young Earth Creationist para-church organization, was himself an Old Earth Creationist. Interviewee C has since had a change of mind and become a Young Earth Creationist. Another example is interviewee I who is a long-time member, expert, and leader in organization Echo. Despite the decades-long Young Earth Creation hegemony within this church organization, this informant has always remained a Theistic Evolutionist.

Regarding the small AEC group within organization Delta, they promote the vague Intelligent Design cartography, but have no consistent habitus among its members. As many have noted, within the Intelligent Design movement their field is hard to categorize as anti-evolutionist despite often being presented in this manner as it is vague enough to incorporate evolutionists as well; still its flagship organization, the Discovery Institute is distinctly AEC (Hill, 2014; Scott & Branch, 2003; Zimmerman &

Loye, 2011). Intelligent Design cartography is vague but specifically it seeks to counter the rampant evolutionism and philosophical materialism which has come to dominate within public science (Miller, 2007). The Intelligent Design movement seeks to look for evidence of design, and therefore of a designer, within scientific data and findings (Numbers, 2006). This vague cartography allows for many different forms of habitus to exist within this movement so having such diversity within organization Delta's AEC group is hardly surprising. What was surprising, given how small the group is at present, consisting of only four members (Interviewee F), is how all three members interviewed had a different habitus. One was an anti-evolutionist ID advocate, another was an evolutionist ID advocate, and the last was a Young Earth Creationist. Data such as this demonstrate how treating all ID advocates as if they all share the same worldview is a big mistake, and lumping all ID advocates into the folk devil of AEC is an even bigger mistake (Numbers, 2006; Scott, 2009). Such a blatant misrepresentation of people, who seem to often believe in evolution, demonstrates clearly how problematic the knowledge of, and lack of engagement with, AECs is impeding efforts to resolve the evolution-creation controversy and public science more generally.

Additionally, it was found throughout these interviews that all of these AEC groups and organizations only required adherence to a vague and minimalist cartography or sometimes did not require any adherence to a cartography at all. Organizations Alfa, Charlie, and organization Delta's AEC group do not require adherence to any particular cartography, despite how their members actively teach, promote, or fund those who advocate AEC worldviews. Organization Echo has a clear AEC hegemony among its leadership and membership but does not explicitly require adherence to a particular cartography. Only organization Bravo requires explicit adherence to a minimalist Young Earth Creation cartography. Therefore, of those regional and local AEC organizations and groups studied here, only a minority actually require dogmatic adherence to a particular cartography, and even then it is vague compared to the larger AEC organizations, and non-adherence would likely not prevent membership in the organization anyways (Interviewee D). Consequently, most of these AEC's groups and organizations do not have a particular cartography they need to adhere to, and the diversity of habitus present within the different groups and

organizations demonstrates that the field cartographies and individual habitus often do not match.

- 5) What are the perceived goals or endgames which these AECs wish to accomplish through their outreach and activities? How do these relate to a possible means of resolving the evolution-creation controversy?

Both collectively and individually, none of the organizations, groups, or individuals discussed in the interviews seek to limit or prevent the teaching of biological evolution. This would not be generalizable to all regional or local AEC groups and organizations within Canada, as there are many which seek to prevent or limit how biological evolution is taught and discussed in Canada (Barker, 2004; Numbers, 2006). Nevertheless, among these organizations, groups, and individuals, this is not their stated goal. This may be due to the hostility towards AEC outreach within the fields of Canadian science, politics, mainstream media, and education (Barker, 2004; Numbers, 2006); possibly forcing them to adopt more modest goals. The four main themes which were discussed when these informants were asked about their endgames and goals for AEC promotion and outreach were: 1) promoting and justifying their particular scriptural interpretation, 2) being critical of and identifying the faults of evolution, 3) empowering Christians to have confidence in and to be able to defend their worldview, and 4) to encourage debate between AECs and the scientific community. These goals all overlap to some extent, i.e. empowering Christians to be able to defend their beliefs often entails learning how to be critical of how biological evolution is taught to the public and learning how to justify their own scriptural positions.

While the first of these goals represents the folk devil representation of AECs within the evolution-creation controversy literature, where AECs are often depicted as only seeking to validate their own scriptural interpretations regardless of the available scientific evidence (Scott, 2009). The other three goals are presently not taken seriously within the evolution-creation controversy literature. However, they can all be addressed through direct engagement with the scientific community, public scientists, academics, and the mainstream media. Such research and engagement into AECs would assist to dispel many of the caricatures, myths, and overgeneralizations of AECs

which have become pervasive in the evolution-creation controversy literature. Most importantly, this style of engagement represents the goals of many AECs. Due to the pervasive folk devil of AEC utilized at present, such engagement may appear to be fruitless and only serving to further legitimate AEC worldviews and arguments. However, once the history of the evolution-creation controversy is taken into account, it is observable that whenever these long-standing and public forums for debate and discussion are allowed to occur, such as in the American Scientific Affiliation (Numbers, 2006), it has demonstrated that AECs both can and do change their worldviews and arguments in accordance with the available evidence; a finding of these interviews as well. The historical and present tactics of non-engagement by the scientific community has done little to prevent the development, growth, and spread of AEC worldwide. The scientific community must now seek to honestly and openly engage with AECs, seek to understand their motivations and goals, and be willing to recognize their own problematic engagement with evolutionary ideas which have in part led to the present state of affairs in the evolution-creation controversy.

7.2 Future Research Recommendations

Based upon the research here, there are many recommendations which can be made regarding what types of research would be particularly useful in the future. Perhaps one of the most fruitful avenues for research would be to engage in a participatory action research study where AECs and public scientists are provided with a public space wherein they can engage with one another over standardized periods of time to see what the result of such interactions would be. They could be interviewed before, during, and afterwards to determine how their biases, worldviews, and arguments might change over this time period. Additionally, this would provide much needed insight into how bridging the evolution-creation controversy divide between AECs and evolutionists alters their perceptions, both of each other, and those on their own side of the divide as well.

Much more research is also required on both regional and local AEC groups and organizations as well. This area is hardly studied at all and there are many questions which remain unanswered regarding these smaller AEC groups and organizations. For

example, how did the AECs within the Canadian Atlantic provinces manage to overcome the desire for autonomy and territoriality present in the western Canadian provinces to create the Creation Science Association of Atlantic Canada? Additionally, how does this large AEC organization interact with the national and international AEC organizations? Or how did it manage to compromise with the public education systems in Atlantic Canadian provinces to avoid discussions on origins in science classrooms?

Lastly, the scientific responses to the evolution-creation controversy are not analyzed in any particular depth in the presently available literature. Problematic concepts such as the folk devil of AEC or the victor's historical narrative are original conceptualizations and do not exist elsewhere in the evolution-creation controversy literature. Additionally there are few breakdowns of the tactics adopted by the scientific community or other public scientists such as the fact of biological evolution discourse, which is utilized as a strictly rhetorical tactic by many within the scientific community to convince the public of the certainty of biological evolution (Jean & Lu, 2018). In particular, the activities, purpose statements, and overall structuring of the new generation of anti-AEC organizations being created by public scientists (Barker, 2004; Forrest, 2008) should be studied similarly to how the AEC groups and organizations are studied, to provide a better overall image of what is occurring on both sides of the evolution-creation controversy.

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